AMERICAN JOURNAL OF ORTHODONTICS

OFFICIAL PUBLICATION OF
THE AMERICAN ASSOCIATION OF ORTHODONTISTS,
ITS COMPONENT SOCIETIES, AND
THE AMERICAN BOARD OF ORTHODONTICS

PUBLISHED BY THE C. V. MOSBY COMPANY, ST. LOUIS 3, U. S. A.

TABLE OF CONTENTS ON PAGE 2

Vol. 35 APRIL, 1949 No. 4

Vol. 35, No. 4, April, 1949. American Journal of Orthodontics is published by The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, Mo. Subscription price: United States, its Possessions, Pan-American Countries $10.00; Canada and Foreign, $11.00. Entered as Second-class Matter January 14, 1915, at the Post Office at St. Louis, Missouri, under the Act of March 3, 1879. Printed in the U. S. A.

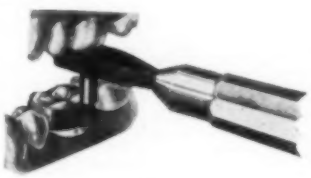
Baker Orthodontic Materials

BAKER SOLDERS

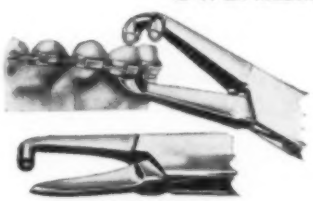
We supply our wire solder, all karats, in the popular 28 gauge or any size required, wound on 5 dwt. spools enclosed in metal spout containers. This convenience proved popular from its introduction. Wire is pulled out as needed. Most orthodontists use 450 fine 14k. For descriptions of solders, see our catalogue.

SWINEHART BAND DRIVER

Consists of a vulcanite shaft and steel spur. The shaft is used first to drive the band partially over the tooth and then the spur, engaging the edge of the band forces it down to the position desired. The patient bites firmly on the shaft and the force of occlusion stretches the band over the tooth.



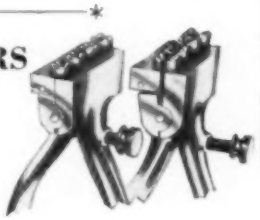
SWINEHART BAND REMOVING PLIERS



MOLAR TYPE

For anteriors, one beak has twin points set at right angles to the jaws. The other has twin cups in which No. 4 lead shot are firmly held. The arrangement permits effective application of force on lingual, labial and buccal surfaces of all teeth. The soft lead shot protect the incisal and occlusal enamel, permitting application of greater force.

WOLFSON BAND FORMING PLIERS



These pliers form the band to first molar teeth of any shape or size. If you wish to enlarge a band at the gingival only, place it on the pliers and apply slight pressure. This does not stretch nor weaken them appreciably. For full description and technique, see our catalogue.

IMPRESSION PLASTER

This is a fine-textured material that mixes smoothly, sets quickly and breaks with a hard, clean fracture. Reproduces the finest details. 5 and 15 lb. tins; 40 and 80 lb. non-leaking metal drums.

SPEEDROCK

Speedrock is a quick-setting stone and is excellent for permanent models. It has an exceptionally hard, smooth surface. Three colors—white, yellow and pink. The physical properties of all are the same. 5 and 15 lb. tins; 50 and 100 lb. non-leaking metal drums.

BAKER & CO., INC., 113 ASTOR ST., NEWARK, N. J.

CONTENTS FOR APRIL, 1949

American Journal of Orthodontics

Original Articles

Orthodontic Abstracts and Reviews

News and Notes

Officers of Orthodontic Societies

ANNOUNCING THE REVOLUTIONARY

New...

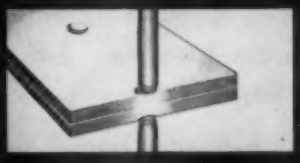
Unimatic

SPOTWELDER

Check These Features

- ✔ Clean-finished weld
- ✔ Uniform performance
- ✔ Auto-adjustment
- ✔ Time-saving
- ✔ Greater weld strength

New Unimatic Weld
Shows no evidence of burning, discoloration or spattering — only a very slight depression.



Old Type Weld
Definite signs of burning, discoloration, spattering and heat distortion—deeply indented.

Note: Comparative sizes greatly exaggerated for diagrammatic purposes.

Unimatic introduces *Pushbutton Spotwelding* . . . press *one* button . . . the *Unimatic* welder does the rest! Yes, this unit actually does your welding thinking for you—no rheostats, no auxiliary timer, no burning, no weld failures, no *guesswork*—merely push the button . . . Unimatic does it all!

Unitek engineers, after intensive research, have developed this revolutionary feature by incorporating in the *Unimatic* welder a sensitive electronic circuit of high selectivity. When actuated by a "touch of the button" the electronic brain instantly determines the amount of resistance heat required to homogeneously bond materials through a range of thicknesses.

Unparalleled for its efficiency and time-saving advantages, the *Unimatic* welder has been designed to meet the exacting requirements of the Orthodontist. Uniform and dependable performance insures a stronger weld, reducing breakage . . . a clean, finished weld, eliminating polishing.

The *Unimatic* unit is sturdily built and compactly designed to occupy a minimum of space. Leads and terminals are provided for evenly-controlled annealing. Platinum gray hammertone finish with chrome trim makes the *Unimatic* a handsome addition for office or laboratory.

Complete Unit — Price $88.00
F.O.B. Pasadena, California

Write TODAY for the complete Unitek catalog!

Unitek
CORPORATION

697 N. LAKE AVE. • PASADENA 6, CALIF.

There is an apparent discrepan

The pages are either missing o

The filming is recorded as the

ıncy at this point.

or the pagination is incorrect.

e book is found in the collections.

cs

American Journal
of
ORTHODONTICS

VOL. 35 APRIL, 1949 No. 4

Original Articles

THE APPLICATION OF THE PRINCIPLES OF CEPHALOMETRIC LAMINAGRAPHY TO STUDIES OF THE FRONTAL PLANES OF THE HUMAN HEAD

ALLEN C. BRADER, D.D.S., M.S., ALLENTOWN, PA.

INTRODUCTION

ADVANCEMENT in scientific knowledge is largely dependent upon the development of new instruments, new methods, and new techniques of study. Frequently, as the record of past investigation reveals, a new approach leads to the formation of entirely new concepts. Brodie[10] wrote: "As in every field of investigation, knowledge in this one [growth of the head] is limited to the degree of development of the techniques of study." The purpose of this investigation was to provide standardized and measurable radiographic projections of the anatomical structures of the human head in planes that were hitherto subject to the limitations of standardized cephalometric roentgenography;[6, 7, 10] it was an attempt to supplement accepted roentgenographic cephalometric techniques by application of the recently developed laminagraphic principle[3] of roentgenography.

A. CEPHALOMETRIC ROENTGENOGRAPHY

Cephalometric roentgenography was introduced in 1922 by Pacini[22] in a thesis entitled "Roentgen Ray Anthropometry of the Skull," for which work he was awarded the Leonard Research Prize by the American Roentgen Ray Society. His was the initial impetus to an adaptation of, and modification upon, then existing anthropometric techniques. Pacini recorded a technique for producing and accurately measuring the anatomical structures of both the dried skull and the living human head in roentgenographic projection on lateral headplates. It was he who first observed the limitations of the cephalometric roentgenogram in anteroposterior projection (frontal headplate):

> It will be noted that no mention has been made of the skull with the view of eliciting any of the lateral measures such as the maximum breadth or greatest transverse diameter. There are two reasons for this omission. In the first place with ordinary roentgenographic

From a thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Orthodontia in the Graduate School of the University of Illinois.

skill, it is a matter of extreme difficulty to secure [anteroposterior] plates that furnish sufficient detail for any measure other than the greatest transverse diameter. In the second place, anthropometrically studied, roentgenograms require such exacting techniques in anteroposterior exposure as to tax the patience of the roentgenologist; so that to insist upon this view would make for initially dissatisfying results, and, therefore, for hindrance in the studying of this science.[22]

It remained for Broadbent (1931 and 1937)[6, 7, 8] to apply similar techniques to growth investigations. His work was an attempt to quantitate the biologic concept of Angle.[5] Broadbent devised the Broadbent-Bolton cephalometer,[6] which instrument first permitted standardization of fixation and orientation and made possible the superpositioning of consecutive headplates (or their tracings). In this manner it was possible to conduct longitudinal roentgenographic investigations on growth and development of the heads of living individuals.

Hofrath, in Germany (1931), also published a paper embodying the principles of roentgenographic cephalometry utilizing the principle of teleroentgenography. His work, however, has never found application in long-range growth investigations.[10]

Adams (1940)[1] tested and published a method whereby projected scales permitted direct absolute measurements on cephalometric x-rays. Elsasser[15] designed and constructed an instrument termed a "compensator" which also permitted direct absolute measurements upon cephalometric x-rays. The utilization of such measuring devices vastly facilitates the mensuration chore involved in cephalometric investigations.

Significant longitudinal investigations upon human growth and development and upon changes incident to orthodontic treatment have been completed by Brodie,[9, 10, 11] Broadbent,[8] Downs,[14] and the staff of the Graduate Department of Orthodontics of the University of Illinois.[12] Principally, these studies have been conducted upon cephalometric roentgenograms in lateral projection as prepared with the Broadbent-Bolton cephalometer and according to standardized techniques. Significant is the paucity of investigation utilizing frontal headplates, attesting to the inadequacy of these films for such purposes.

B. PRINCIPLE AND DEVELOPMENT OF THE LAMINAGRAPH

Laminagraphy permits projection, on x-ray film, of any selected plane of a body to the exclusion of all other planes.

The fundamental principle [of the laminagraph] is that the tube [target or anode] and film move during exposure in such a manner that the roentgenographic shadow of a selected plane remains stationary on the moving film [building up an image] while the shadows of all other planes have a relative displacement upon the film, and are therefore blurred to varying amounts depending on the distance of such planes from the one selected.[17] (Figs. 1 and 2.)

Hence, the laminagram makes possible the visualization of certain anatomical structures or pathologic lesions which are not susceptible to clear projection by any other method.

The laminagraph is, in effect, a mechanical focusing device which allows the operator to reproduce radiographically and to visualize the various strata of a

body much in the manner of the microscope. The thickness of the "lamina" in focus is related to the amplitude of the target-film excursion and target-object distance but, for the most part, is of the order of 2 to 5 mm.[21]

Bocage (1922) first published information relative to body-section roentgenography; he explained three planigraphic methods:

1. The tube and the film move reciprocally in straight lines along planes that are parallel to each other.

2. The tube and the film move reciprocally in circles, squares, crosses, and in Archimedean spirals along planes parallel to each other.

3. The tube and film rotate reciprocally about an axis that lies in the plane of the body to be recorded.[20]

Vallebona (1930) devised and was the first to utilize a successful apparatus. Ziedses des Plantes (1931)[24] independently devised apparatus embodying the second principle of Bocage. Bartelink (1932) improved Vallebona's method.

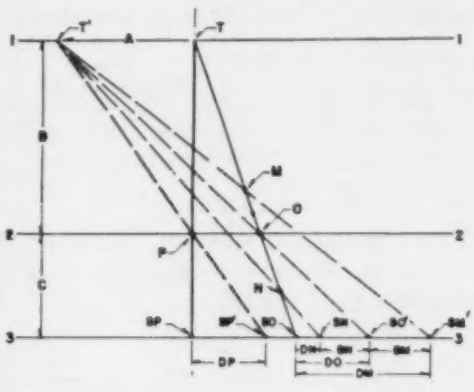


Fig. 1.

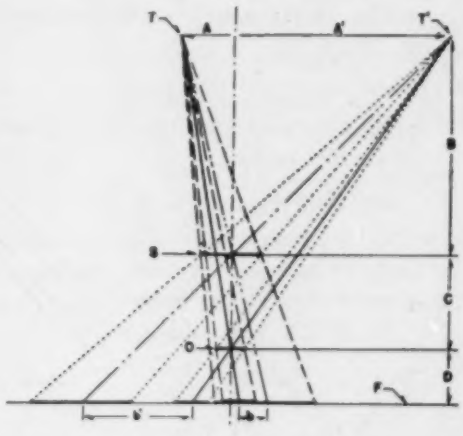


Fig. 2.

Fig. 1.—Description of planigraphic principle used in laminagraph. *1-1*, Target travel plane; *2-2*, plane focused upon; *3-3*, film travel plane. These planes are parallel to one another and to the film surface. When target is given a motion of amplitude *A* along plane *1-1* from *T* to *T'*, the pivot rod, turning around a fulcrum, the axis of which is at *P* on plane *2-2*, will move the film along plane *3-3* the distance *DP*. The shadow of point *P* will follow the film from *SP* to *SP'* and remain stationary thereon. The shadow of point *O* moves from *SO* to *SO'*, or the distance *DO*. Distances *DP* and *DO* form the bases of triangles *P-SP-SP'* and *O-SO-SO'* which have a common height *C*, while their opposite triangles *T-T'-P* and *T-T'-O* have a common height *B* and a common base *T-T'*, so that *DP* and *DO* are equal to one another and to $A \times C/B$; therefore, the shadow of point *O* will also remain stationary on the film. This reasoning can be extended to all points on plane *2-2*; therefore, the shadows of all points on this plane will remain stationary on the film, and film shadows of objects in this plane remain the same size. Shadows of points *M* and *N* not on this plane will not be similarly displaced along plane *3-3* because the ratio C/B no longer governs the amplitude of their motion. The shadow of point *M* will be displaced the distance *DM*, from *SO* to *SM'*, and therefore have a relative displacement on the film equal to *BM* and be blurred by that amount. Similarly, the shadow of *N* will have a blurring of amount *BN*. As this reasoning can be applied to all points between planes *1-1* and *3-3* for any amplitude, it follows that the shadows of points or objects in plane *2-2* will be the only ones to remain stationary on the film and be sharply rendered, all other shadows being blurred to an amount depending on their distance from the plane in focus, regardless of the amplitude used.

Fig. 2.—Two-fold effect of motion. *O*, Object to be visualized; *S*, structure obscuring the object *O*; (solid line), solid link whose pivot is set at the level of *O*; *T*, *T'*, various positions of target on its plane of travel; *F*, plane along which film travels. With amplitude *A*, the shadow of *O*, which follows the solid link and the film, will never be out of the shadow of *S*. If *S* is completely opaque, *O* cannot be visualized. With amplitude *A'*, the shadow of *O* will be clear of the shadow of *S* for an appreciable portion of the exposures and therefore will be rendered on the film. If structure *S* is not completely opaque, but possesses a semitransparent complex structure, each point of this structure will have a motion on the film equal to *b* for amplitude *A*, and consequently will be blurred sufficiently to permit good visualization of the object *O*, even with this relatively small amplitude. The separation *b* of the center of these shadows on the film, which is the measure of their relative displacement, is a function of the relative distances *B*, *C*, and *D*, as well as of *A*, so that this separation will be somewhat different for a motion along parallel planes as here illustrated, than for a motion along arcuate paths, as used in Grossmann's tomograph, though the effects are the same.

Figs. 1 and 2 are reproduced with the permission of Mr. Jean Kieffer and The C. V. Mosby Company. Grateful indebtedness is acknowledged.

Grossmann (1935) introduced tomography, which method embodies the third principle of Bocage.

Andrews (1936)[3] performed the first tomography in this country. Kieffer's laminagraph was completed in 1937; he first published an article about it in 1938.[17]

The generic term for all existing methods as suggested by Kieffer[18] is body-section roentgenography; variations of this principle and their contributors include the following as given by Andrews[3, 4]:

1. Stratigraphy: Vallebona[3] and Andrews.[3] This is a method of body-section roentgenography accomplished by rotating the body between stationary target and film.

2. Tomography: Andrews,[3] Grossman, and modified by Andrews and Stava.[4] This is a method of body-section roentgenography accomplished by motion of the tube and film along concentric segments of arcs, the film maintaining its orientation with respect to the body in focus.

3. Planigraphy: Bocage,* Andrews,[3] Portes and Chausse,† Ziedses des Plantes,[24] Kieffer,[17] and Twining.[23] This is a method of body-section roentgenography accomplished by motion of the target and film along planes parallel to each other and to the film surface.

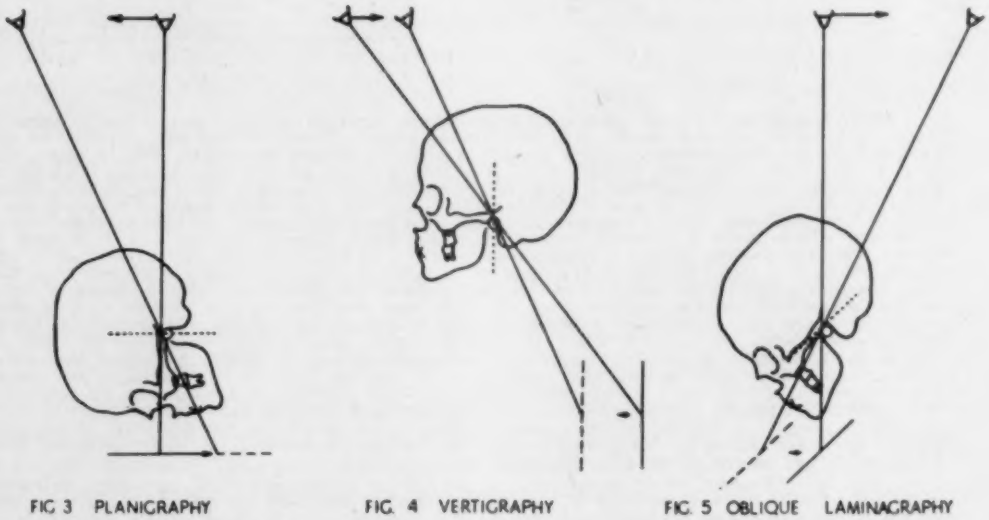
(Fig. 3.)

4. Vertigraphy: Kieffer.[17] This is a method of body-section roentgenography accomplished by motion of the target and film in planes parallel to each other and perpendicular to the film surface.

(Fig. 4.)

5. Laminagraphy (terminology suggested by Moore): Kieffer.[20] This is a principle of body-section roentgenology accomplished by motion of the target and film in planes parallel to each other and at any angle to the film surface.

(Figs. 3, 4, and 5.)



Figs. 3, 4, and 5.—Three laminagraphic methods of body-section roentgenography.

This particular work was confined to an investigation of the planigraphic principle of laminagraphic roentgenography (3, above), this limitation being imposed by the available apparatus.

*French Patent No. 536,464, 1922.
†French Patent No. 541,941, 1922.

C. OBJECTIVES OF THE PRESENT INVESTIGATION

The fundamental objectives of this investigation were threefold:

1. To demonstrate the practicality of the laminagraphic method in projecting on x-ray film certain cranial and facial planes of interest to the student of human growth.

2. To demonstrate the accuracy of this technique by comparing measurements of certain dental structures in laminagraphic projection with identical measurements taken directly upon dental casts. It is presumed that application will be made of correctional scales in this comparison as in conventional cephalometric roentgenography.

3. To standardize exposure technique and head positioning so as to permit the direct superpositioning of subsequent films (or their tracings) as an essential to future longitudinal investigations on growth in the frontal planes.

METHODS AND MATERIALS

A. Basic Method.—Laminagraphy, applied in combination with the techniques of cephalometric roentgenography, comprised the basic method of this investigation. Standardization of exposures necessitated requirements of methodology which may be summarized as follows:

1. Constancy of source of x-rays as to the size and nature of target.
2. Constancy of position of the head in relation to the source of x-rays, which implies:
   a. Employment of a headholding device which must maintain constancy of position in relation to the source of x-rays, and
   b. Constancy of position of the head in relation to the headholding device.
3. Constancy of distance of target to film.
4. Constancy of distance between target, film, and plane of focus (focal plane). This particular requisite is unique to laminagraphy.
5. Utilization of a projected metric scale.

B. Materials.—

1. The laminagraph: The laminagraph employed herein is a device which was designed by Jean Kieffer[17] and was constructed by the Kelley-Koett Manufacturing Company, Inc., of Covington, Kentucky. It is equipped with a Machlett, A.C. type, shockproof tube which is energized by standard equipment. This double-focus tube permits use of either small (1.5 mm.) or the larger (3.5 mm.) focal spot. In this work emphasis on detail in the finished laminagram necessitated employment of the small (1.5 mm.) focal spot. (Fig. 6.)

2. The headholding device: A headholding device was utilized to permit the localization of a projected plane in such a manner that repetition of exposure yielded headplates which were strictly comparable in orientation and magnification. The device employed in this work was an instrument similar to the Broadbent-Bolton cephalometer,[6, 10] without x-ray equipment; it was constructed to be used with the patient in a horizontal position on the table of the laminagraph. The self-centering earpost portion was designed and constructed by Dr. Tirk and Dr. Thurow and was modified by the author for adaptation to the available laminagraph. (Figs. 7 and 8.)

3. Projection scale: A metal, metric projection scale, adjustable to a vertical, plastic metric scale, was designed and constructed by the author; in use, it was set at the level of the selected plane of focus as measured in millimeters above the surface of the laminagraph table (Figs. 7 and 9). The image of this metal scale was projected on each film and served a double purpose: (1) to permit direct absolute mensuration of the images of the anatomical structures *in focus* and (2) to check upon the accuracy of the laminagraph setting which determined the level of the plane of focus. Thus, if the projected scale image was not sharply rendered on the film it was assumed that the projected anatomical plane was not the one selected, and conversely.

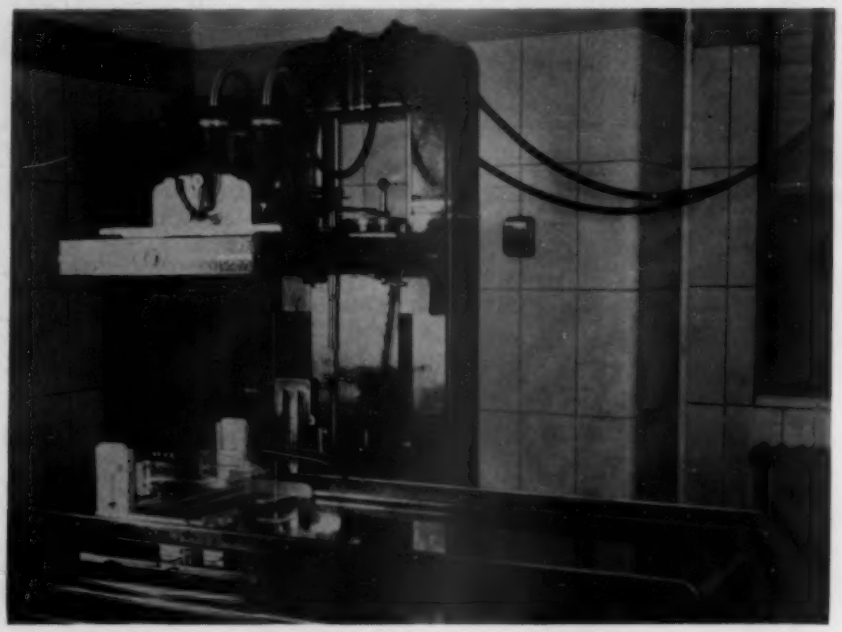


Fig. 6.—Photograph of the laminagraph.

In an effort to determine the accuracy with which the focal plane might be determined by the laminagraph adjustment, a critical test was conducted upon the apparatus, as follows: The metal projection scale was placed 60 mm. above the laminagraph table. The focal plane adjustment was set to project a plane 55 mm. above the table surface and an exposure was made. The focal plane adjustment was increased 1 mm. for each of ten successive exposures. The scale image was rendered upon films at the level of 57 mm. to 62 mm. inclusive. This range completely exhausted the depth of the plane of focus. From this experiment it was learned that the thickness of the focal plane was of the order of 5 mm. and that the midpoint of the focal plane (scale image most sharply rendered) lay between 59 and 60 mm. as determined by the laminagraph focal plane adjustment. Therefore, the midpoint of the plane actually projected lay within 1.0 mm. of the reading of the machine adjustment.

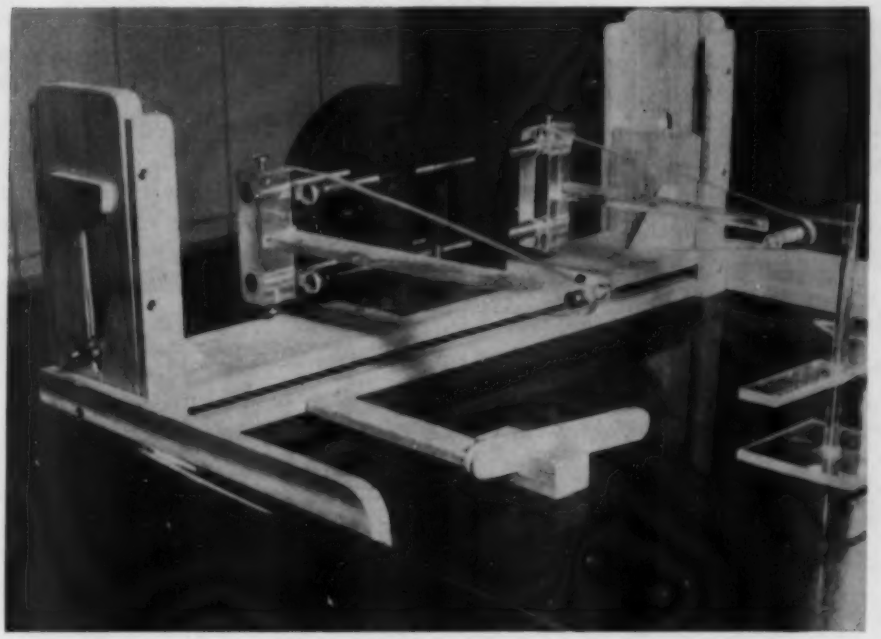
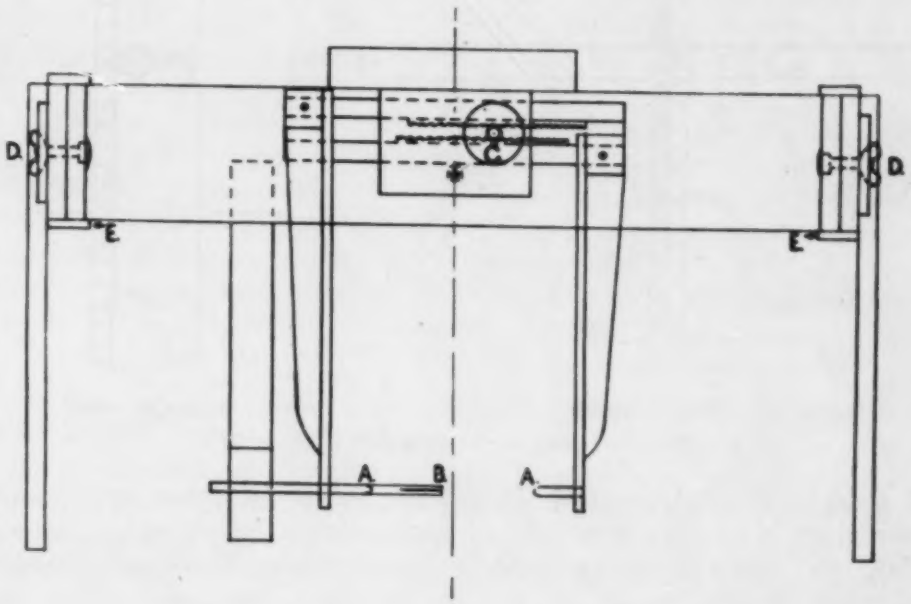


Fig. 7.—Photograph of the headholding device and the projection scale.



A - EARPOST
B - ORBITALE INDICATOR
C - EARPOST CONTROL
D - SLIDING VERTICAL CONTROL
E - VERTICAL SCALE IN MILLIMETERS

Fig. 8.—Design of the headholding device; superior view.

4. Films and screens:

The roentgenographic film used was Eastman Blue Brand duplitized x-ray film and was used with Patterson Par Speed Intensifying Screens. Laminagraphy prohibited the utilization of a conventional Potter-Bucky diaphragm. Nevertheless, secondary radiation was partially controlled by two means: (1) the placing of a wafer grid between the head and the film, and (2) the tube diaphragm was stopped down to a reading of 6½ inches when using 8 by 10 inch films at a target-film distance of 36 inches.

5. Patient material: The patient material for this investigation comprised:

1. One congenitally malformed infant (Fig. 14).
2. Ten normal adults (Figs. 10, 11, 12, and 13).
3. One adult cleft palate patient (Figs. 15, 16, and 17).

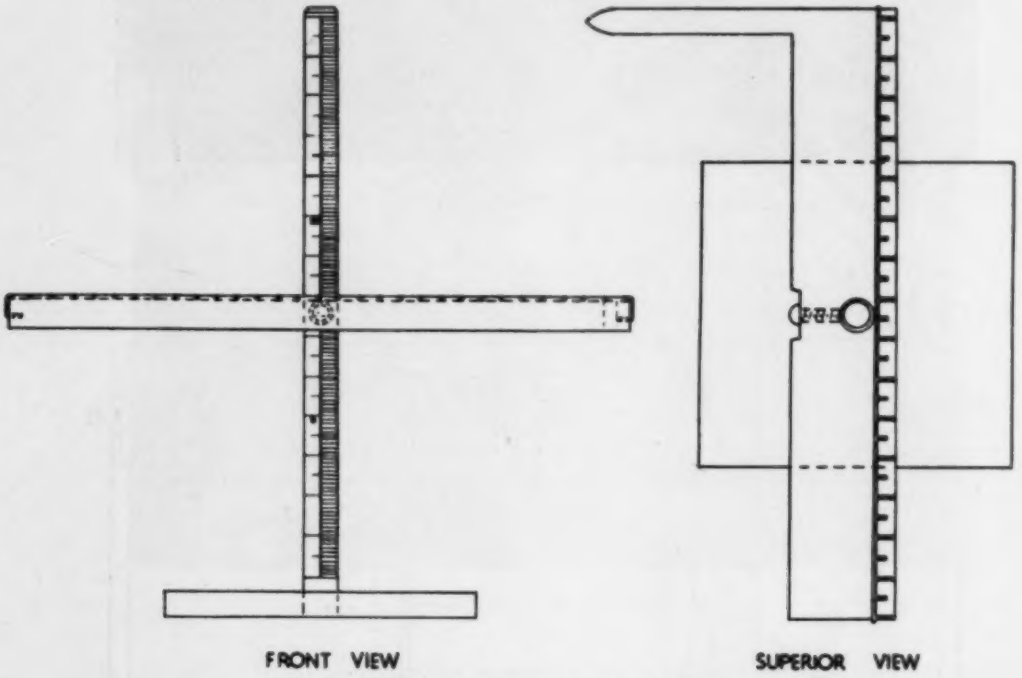


Fig. 9.—Design of the projection scale.

C. Orientation of Apparatus.—In order to fulfill the special requirements of methodology in the standardization of laminagraphic exposures (see Methods and Materials), the headholding device and projection scale were employed in the following manner:

1. The headholder (Fig. 6) was positioned in constant relation to the laminagraph table surface to insure that the central ray (or axis of target rotation in laminagraphy) passed through the midpoint of the earpost axis of the headholder and perpendicular to that axis and the table surface. This was accomplished in one plane of space by lining up the earposts of the headholder with the red line on the tube carriage. This line, placed by the manufacturer, indi-

cated the path of the axis ray. Bilateral positioning was provided by the construction of the headholder framework which was just wide enough to be received within the flanges along the edges of the laminagraph table. The headholder proper was centered in this framework in relation to the central ray, and the earposts were controlled by a reciprocating double rack and pinion device. (Fig. 8, *C*.)

The headholder was constructed with an adjustable base which permitted raising or lowering the earpost assemblage so that the heads of different sizes could be accommodated. Duplicate right and left millimeter scales (Fig. 8, *E*) permitted making a permanent record of the vertical adjustment employed for each individual. The right and left vertical scale readings were equal to each other for all exposures.

2. The metal projection scale was fixed at the identical distance above the table surface as that recorded on the laminagraph adjustment which controlled the plane of focus. It was then brought as close to the head as possible. Such situation placed the metal projection scale in the plane of focus and assured the operator that as much of its length as possible would be projected.

D. Patient Preparation and Orientation.—A soft (2H) pencil was used to mark the position of the left orbitale directly on the face of the patient. The patient was then oriented in prone position on the laminagraph table surface as follows: (1) the tip of the nose rested on the table surface; (2) the external auditory meati were parallel to the table surface, roughly approximating the positions of the earposts; (3) the midsagittal plane was perpendicular to the table surface and parallel to its indicated midline.

The earposts were then placed gently into the external auditory meati, and the head was rotated forward and downward until the pencil mark indicating the position of the left orbitale coincided with the center line on the left orbitale indicator of the headholding device (Fig. 8, *B*). Thus all projected planes were oriented perpendicular to the Frankfort horizontal plane.

The patient was requested to arrest breathing during the time required for each exposure. Infants required sedation; Seconal was the sedative of choice employed in this investigation.

E.—The first planes exposed were selected at random levels in order to ascertain those which could be most efficiently projected and would, at the same time, reveal the greatest number of anatomical structures deemed interesting for this and subsequent investigations. Subsequently, arbitrary exposures were made consecutively at one centimeter intervals above the surface of the laminagraph table top. Adequate adjustment was provided by the machine to permit the projection of the plane of any selected level. (Figs. 10, 11, 12, and 13.)

Strict limitation exists in the number of exposures which may be made upon any one individual during the same appointment; total exposure may be computed and *must* be within the safe limits of exposure to which the patient may be subjected. Tables for such comparison are available in many standard roentgenography texts.[16]

F. Laminagraph Exposure Factors.—Laminagraphic roentgenography presents several variables which are not inherent to conventional roentgenography.

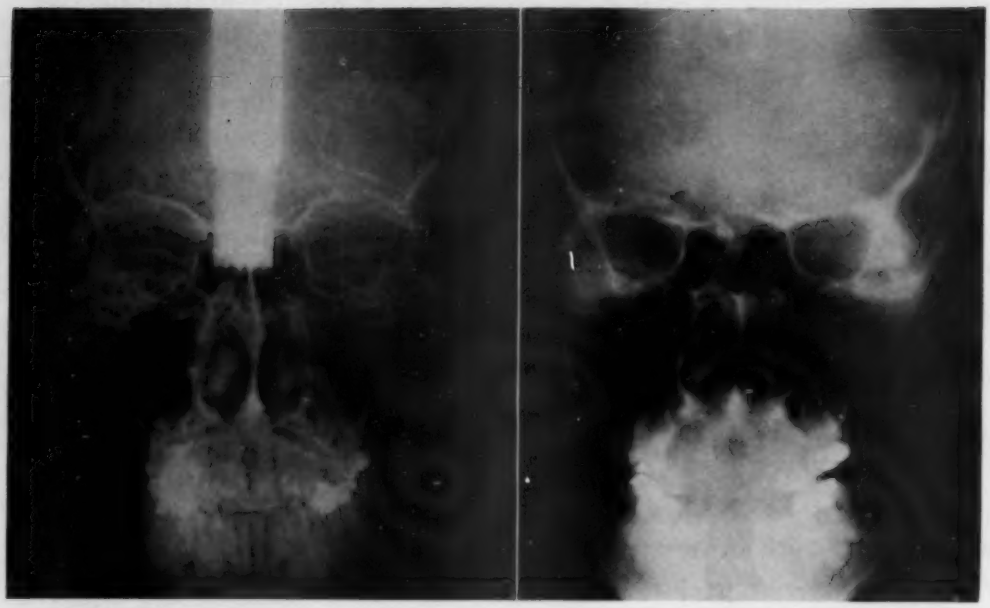


Fig. 10. Fig. 11.

Fig. 10.—Standardized frontal headplate of patient R. R. prepared with the Broadbent-Bolton cephalometer.

Fig. 11.—Cephalometric laminagram of patient R. R. projected at the level of the maxillary first molars.

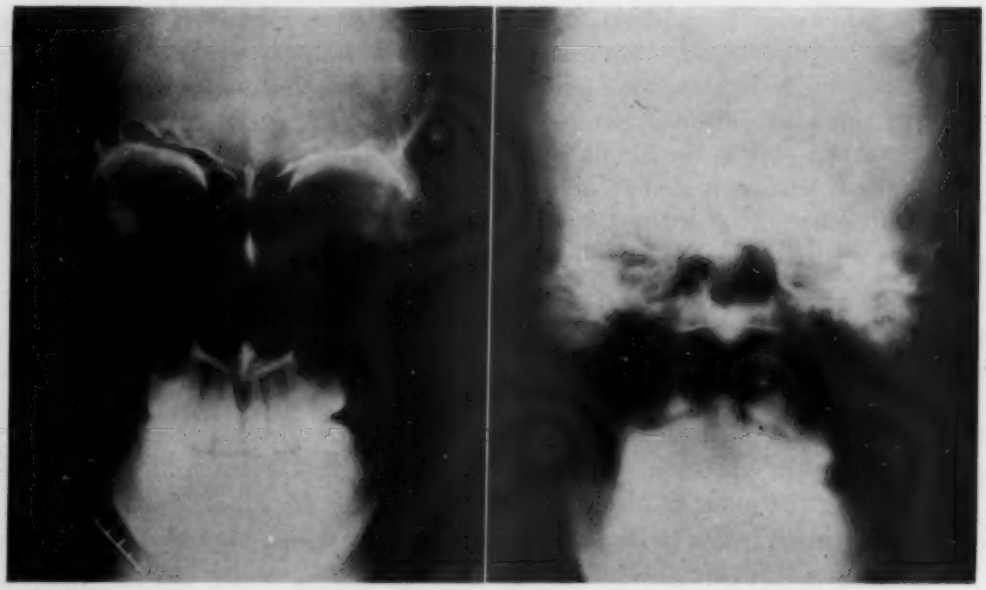


Fig. 12. Fig. 13.

Fig. 12.—Cephalometric laminagram of patient R. R. projected at the level of the maxillary central incisors.

Fig. 13.—Cephalometric laminagram of patient R. R. projected at the level of the heads of the condyloid processes of the mandible.

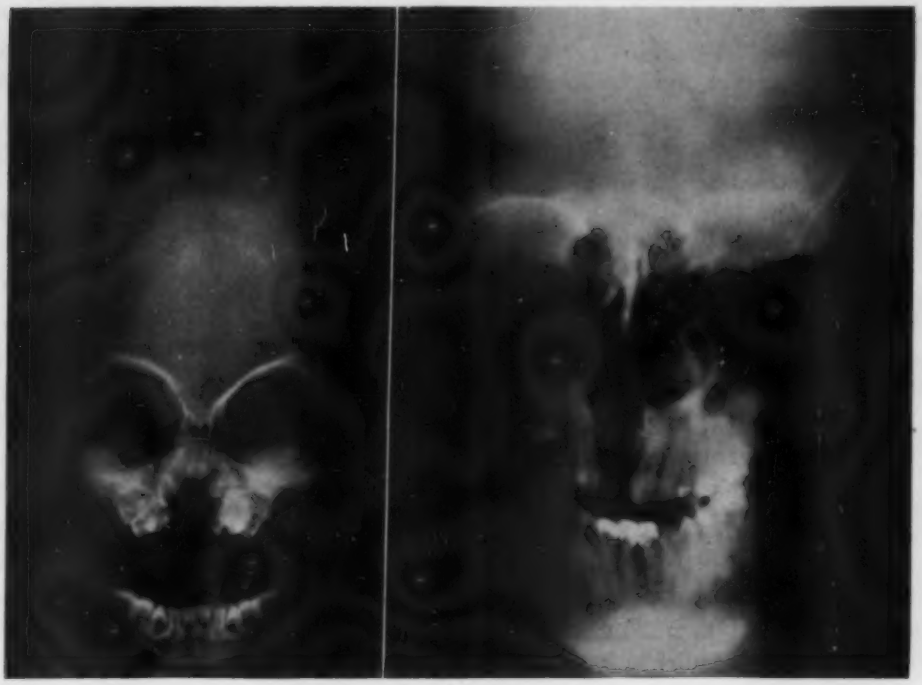


Fig. 14. Fig. 15.

Fig. 14.—Cephalometric laminagram of an infant (7 months) projected at the level of the unerupted maxillary second deciduous molars.

Fig. 15.—Cephalometric laminagram of patient J. M. projected at the level of the maxillary canines.

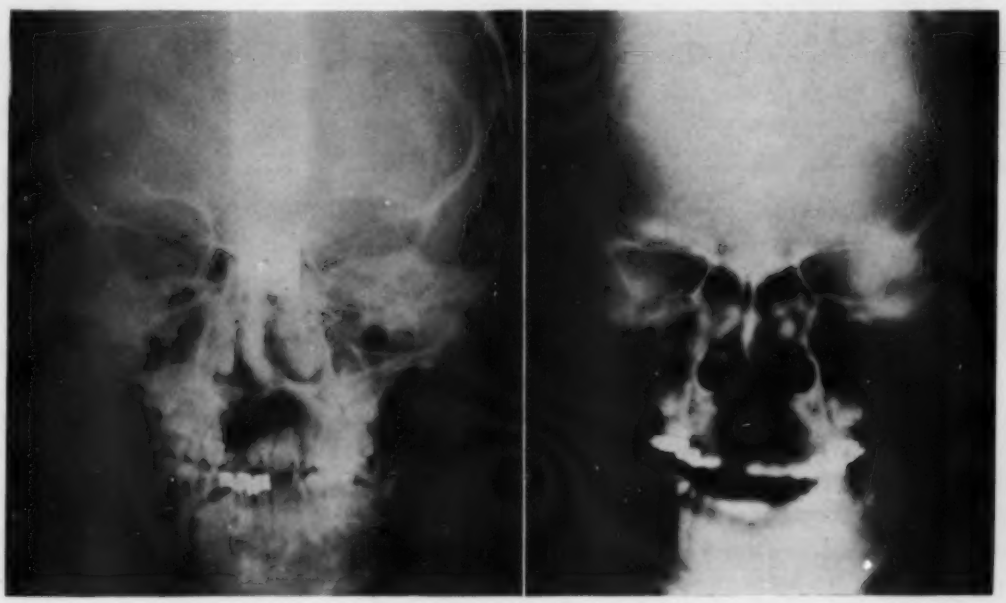


Fig. 16. Fig. 17.

Fig. 16.—Conventional frontal headplate of patient J. M., adult cleft palate patient.

Fig. 17.—Cephalometric laminagram of patient J. M. projected at the level of the maxillary second molars.

These variables affect the quality of the laminagram. They are as follows:

1. Orientation of the target motion: Laminagraphic technique permits target motion which may be linear, circular, or spiral. Theoretical proof has been offered by Kieffer[19] that spiral motion of the target confers the greatest blurring effect upon the images of all planes other than the one selected. Consequently, all target orientation in this investigation was spiral in nature; the target revolved about its central axis in concentrically decreasing arcs and imparted a similar proportional and reciprocal motion to the film and its carrying device.

2. Amplitude of the target motion: In relation to the target-object distance, the amplitude determines the thickness of the plane of focus. In general, for the same target-object distances, an increase in target amplitude is accompanied by a decrease in the thickness of the focal plane. Using spiral target orientation, the amplitude of the target for the first revolution is approximately 8 inches with the apparatus employed. Each successive revolution decreases the amplitude; during the fifth and final revolution it is about 2 inches.

3. Rotor speed: This is measured in seconds per revolution and determines the rate of travel of the target and the film. It is determined by dividing the total number of seconds of exposure time by the total number of revolutions (five, in spiral target orientation). Thus, for a five-second exposure the rotor speed setting should be one second per revolution; for ten seconds of exposure time the rotor speed setting should be two seconds per revolution. (Table I.)

TABLE I. ROTOR SPEED DETERMINATION

EXPOSURE TIME IN SECONDS	NUMBER COMPLETED REVOLUTIONS (SPIRAL MOTION)	ROTOR SPEED ADJUSTMENT SETTING
5.0	5	1
6.25	5	1¼
7.5	5	1½
8.75	5	1¾
10.0	5	2
11.25	5	2¼
12.5	5	2½

4. Orientation of the plane of focus or "focal plane": This is a measure of distance between the level of the plane of focus and the surface of the laminagraph table. It involves a simple adjustment of the hand crank situated on the front of the laminagraph tube carriage, and sufficient range is available for the projection of any desired plane permitted by the orientation of the patient. It is recorded upon a metric scale provided upon the tube carriage for that purpose.

In laminagraphy, as in conventional roentgenography, the diagnostic quality of any given exposure is a result of the interrelationship between three principal exposure factors, viz: peak kilovoltage (K.V.P.), milliamperage (Ma.), and time in seconds or fractions thereof (S.).

Peak kilovoltage may be referred to as the penetration factor.[16] It affects, principally, the over-all density and contrast of the exposed film. It was computed individually for each patient as follows:

1. The thickness of the skull in the direction of the x-ray penetration was measured in centimeters with calipers.

2. This determination was multiplied by 2.

3. A constant factor was added for the screens employed; this equals 30 K.V.P. for the Patterson Par Speed screens which were used.

4. Four K.V.P. were subtracted from the result of 1 to 3. Four K.V.P. are a constant when using spiral target orientation.

5. The resultant figure served as a basic value for the kilovoltage peak required by the individual for a given exposure. Revision by addition or subtraction might be required depending upon the age, sex, and state of health, or depending upon the individual experience of the operator. Certain basic values of K.V.P. are given in Table II and are based upon the results of this investigation. Table III presents standardized values for correction of the K.V.P. determination based upon the variations in age of the patient.

TABLE II. BASIC EXPOSURE FACTORS FOR LAMINAGRAPHY EMPLOYED IN THIS INVESTIGATION

CENTIMETER THICKNESS OF PART BEING RADIOGRAPHED	EXPOSURE TIME IN SECONDS (S.)	MILLIAMPERAGE (Ma.)	PEAK KILOVOLTAGE (K.V.P.)
6	7	20	38
7	7	20	40
8	7	20	42
9	8	20	44
10	8	20	46
11	8	20	48
12	9	20	50
13	9	20	52
14	9	20	54
15	10	20	56
16	10	20	58
17	10	20	60
18	11	20	62
19	11	20	64
20	12	20	66

TABLE III. GENERAL X-RAY EXPOSURE CORRECTION FOR AGE*

AGE IN YEARS	PER CENT EXPOSURE	K.V.P. REDUCTION
14-55	100	0
12	90	1
10	82	2
8	72	3
6	64	4
4	56	6
2	48	8
1	44	9

*After Kelley-Koett Exposure Chart.

Milliamperage is a measure of the rate of the total flow of electricity through the x-ray tube. It is an indicator of the effective output of the x-ray apparatus. Its value affects both the density and contrast of the exposed film. In this investigation 20 Ma. was the Ma. value utilized for the reason that such value permitted the use of the smaller focal spot of the available apparatus. Smaller focal spots (targets) make for more distinct definition of the projected images.[16]

The time factor employed in skull laminagraphy was the most difficult exposure factor to ascertain. Experimentally determined values of S. are given in the basic factor chart (Table II).

G. Film Development Factors.—All the films utilized in this work were developed in thermostatically controlled development tanks. They were maintained in the developing solution for three and one-half minutes at a temperature of 68° F.

H. Measurement of Laminagrams and Correction for Magnification.—Laminagraphically projected images are subject to magnification to the same degree as images projected by standard roentgenography. Such magnification may be computed by application of a simple proportion formula:

$$\frac{\text{object dimension}}{\text{image dimension}} \cdot \cdot \cdot \frac{\text{target-object distance}}{\text{target-film distance}}$$

By projecting on each laminagram the image of the metal scale from the level of the focal plane, the labor of individual calculation for each measurement was saved (Fig. 12, bottom). This scale may be cut from the film and used to make direct absolute measurements of the images on the film, or it may be measured in situ to establish the degree of magnification. If this is done, the measurements may be corrected mathematically.

It was decided to determine the accuracy of measurements made employing the laminagraphically projected scale. Certain measurements were made upon the teeth on a series of laminagrams of an individual, utilizing the projected scale; correction for magnification was made mathematically, and the resultant reading was tabulated. Similar measurements were then taken directly upon the dental casts of the same individual and were similarly recorded for comparison. Table IV and Table V present the tabulated result of this comparison.

I. Standardization of Laminagrams for Cephalometry.—In order to make subsequent exposures susceptible to direct superposition, it was decided to adhere to the principles of orientation of the apparatus and patient given in detail in sections C, D, and E of Methods and Materials. With the achievement of constancy of relationships of patient and apparatus described, it is inferred that subsequent exposures of the same individual might be compared directly with each other. This would permit longitudinal investigations of the same individual.

J. Summary of Laminagraphic Technique.—For convenient reference, a summation of the operations required for the production of cephalometric laminagrams follows.

1. Preparation of the patient:

a. With soft pencil mark upon the face of the patient the position of the left orbitale.

b. Determine with calipers the centimeter thickness of the head in the direction of the path of the central ray. Do not include the length of the nose.

c. With infants, sedation is a prerequisite for elimination of movement during exposure. Seconal was the sedative of choice in this investigation.

2. Individual laminagraph adjustments:

a. Lock the tube carriage in position in relation to the laminagraph table, considering the provision for sufficient surface for accommodation of the patient in the prone position.

TABLE IV. COMPARISON OF PROJECTED CORRECTIONAL SCALE (P.S.) AND ACTUAL MEASUREMENTS (A.M.) OF CERTAIN DENTAL STRUCTURES

DEPTH OF PLANE OF FOCUS IN CENTIMETERS (FILM NUMBER)	4		5	
PERCENTAGE CORRECTION	91.5		90.3	
COMPARISON	P. S.	A. M.	P. S.	A. M.
1. Width between distal contacts of maxillary central incisors	16.5	17.0		
2. Width between distal contacts of maxillary lateral incisors	29.7	30.0		
3. Width between distal contacts of mandibular central incisors	11.0	11.0		
4. Width between distal contacts of mandibular lateral incisors	21.0	21.0		
5. Width between incisal tips of mandibular canines	26.5	26.0		
6. Width between buccal surfaces of mandibular first premolars at gingival margin			41.9	42.0
7. Width between buccal surfaces of mandibular right first and left second premolars			46.0	45.5
8. Width between lingual surfaces of mandibular first premolars			28.4	28.5

TABLE V. COMPARISON OF PROJECTED CORRECTIONAL SCALE (P.S.) AND ACTUAL MEASUREMENTS (A.M.) OF CERTAIN DENTAL STRUCTURES

DEPTH OF PLANE OF FOCUS IN CENTIMETERS	6		7		8	
PERCENTAGE CORRECTION	89.6		88.6		86.5	
COMPARISON	P. S.	A. M.	P. S.	A. M.	P. S.	A. M.
9. Width between buccal surfaces of maxillary first molars	60.9	61.0				
10. Width between lingual surfaces of maxillary first molars	39.2	39.0				
11. Width between buccal surfaces of mandibular first molars	56.4	56.0				
12. Width between lingual surfaces of mandibular first molars	34.8	35.0				
13. Width between buccal surfaces of maxillary second molars			65.1	65.5		
14. Width between lingual surfaces of maxillary second molars			44.1	44.0		
15. Width between buccal surfaces of maxillary third molars			67.3	67.0		
16. Width between lingual surfaces of maxillary third molars			46.9	47.0		
17. Width between buccal surfaces of mandibular second molars					62.2	62.5
18. Width between buccal surfaces of mandibular third molars					68.0	68.0

b. Replace the conventional Potter-Bucky diaphragm with the wafer-type grid which is a part of the apparatus. These diaphragms are kept in drawers in the base of the laminagraph table.

c. Position the laminagraph tube 36 inches from the film. There is a convenient scale upon the back of the tube carriage for this purpose.

d. Set the rotor pin at the outer extremity of the *slot* in the rotor plate to establish tube orientation for spiral motion.

e. Determine the desired number of seconds per revolution required for exposure and set the rotor speed control at this figure. Consult Tables I and II.

f. Unlock the holding device which maintains the position of the tube during conventional radiography.

g. Close the tube diaphragm to a reading of 6½ (when using 8 by 10 inch films) to reduce scattered radiation. This operation requires two separate adjustments.

h. Determine the distance of the selected plane of exposure above the table surface in centimeters and adjust the gauge on the front of the tube carriage to the value selected.

3. Orientation of the headholding device:

a. Place headholder on table surface.

b. Line up both earposts with the red line on the tube carriage.

4. Control panel factors:

a. Turn "main" switch to "on" position.

b. Turn technique control handle to "laminagraphy."

c. Adjust voltage compensator.

d. Calculate desired kilovoltage and set auto-transformer to proper K.V.P. Consult Table II.

e. Set milliamperage at 20.

f. Determine time of exposure in seconds and set timer lever. Consult Tables II and III.

5. Orientation of the patient:

a. Instruct patient in what is expected of him.

b. Position patient in prone position on the laminagraph table surface with the head resting between the widely spread earposts. The patient's hands may be folded and placed under the chest.

c. Gently place the earposts in their respective external auditory meati until they are comfortably tight.

d. Rotate the face forward and downward until the pencil mark indicating the left orbitale coincides with the center of the orbitale indicator of the head-holding device. Fig. 8, *B*.

e. Immobilize the patient.

6. Orientation of projection scale:

a. Refer to the distance of the selected plane of exposure above the table surface and adjust the metal scale to that level. This setting must coincide with the focal plane setting on the laminagraph tube carriage gauge.

b. Place the projection scale in juxtaposition with the head to assure its image appearing upon the exposed film.

7. Final steps:

a. Remove 8 by 10 inch loaded film cassette from the storage box.

b. Center the film in its carrying device in relation to the patient's head and lock it in that position.

c. Attach lead markers to the cassette showing patient's initials and height of the plane of the exposure above the table surface, e.g., AB 6.0.

d. Push film-carrying device beneath the table; it centers itself automatically.

e. Instruct the patient to inhale and *hold the breath.*

f. Press timer button on the control panel and make the exposure.

g. Release the patient and process the film.

h. Determine adequacy of the exposure and, either

i. Correct exposure factors and repeat the procedure, or

j. Record the patient's name, age, and sex; also the date and exposure factors (K.V.P., Ma., and S.) in permanent form for future reference.

k. Dismiss the patient.

CONCLUSIONS

The following conclusions seem justified as a result of this investigation:

1. The production of cephalometric laminagrams is a practical method of visualization of the anatomical structures of the skull in frontal projections. The method permits accurate determination of the configuration and dimensions of structures which are obscure by conventional methods. (See Figs. 10 to 17, inclusive.)

2. The preliminary tests to determine the accuracy with which images in laminagraphic projection may be measured indicate that such measurements lie within the limitations of scientific accuracy, i.e., within 0.5 mm. of direct measurements (see Table IV and Table V).

3. In application with the accepted principles of standardized exposure techniques employed in cephalometric roentgenography, laminagraphy, by inference, may be utilized to meet the specifications of exposure technique requisite to the undertaking of longitudinal investigations. (See Discussion.)

DISCUSSION

Cephalometric laminagraphy may well provide the student of human growth with a new tool with which to approach the problems of growth and development.

Initial inspection of laminagraph exposures imparts a feeling of distrust of the accuracy of the projected images because many structures on the over-all film appear blurred. It must constantly be borne in mind while viewing laminagrams that only those structures lying in the projected plane are sharply rendered, while structures in approximating planes are *deliberately blurred* images. Fig. 13 is a case in point; the heads of the mandibular condyles and a cross section of the body of the sphenoid bone and the petrous portions of the temporal bones appear alone in sharp rendition. The blurred images on the remainder of the film are purposely out of focus; they may be visualized only by alterations of the focal plane and exposures made at the levels of the skull at which these structures are located.

It would appear that the techniques of cephalometric laminagraphy meet the requirements for longitudinal investigations on changes in skull anatomy; such studies demand that images in roentgenographic projection be susceptible to measurement within the limitations of scientific accuracy and that exposure technique be standardized to permit the superpositioning of subsequent films or their tracings. The critical tests herein conducted to determine the accuracy of measurements made upon images in laminagraphic projection revealed that the discrepancies existing between film and actual measurements were of the order of 0.5 mm. They were random in nature; film measurements sometimes exceeded actual measurements and sometimes were less than actual measure-

ments. Furthermore, the same measurements repeated at subsequent intervals were found to vary within the same extremes, suggesting that the error inherent in the operator exceeded that in methodology. Certain additional critical tests remain to be performed upon dried skull material in order to substantiate fully our belief that laminagram images may be accurately measured. The scope of this investigation prohibited undertaking tests beyond those described.

Subsequent films showing the same focal plane of the same individual indicate that superpositioning is permissible within the tolerances inherent to conventional cephalometric roentgenography.

Future laminagraphs may be constructed with greater accuracy of focal plane adjustment. A test conducted upon the available laminagraph indicated that the midpoint of the plane actually projected lay within 1 mm. of the reading of the machine adjustment. It is felt, however, that for practical purposes the present apparatus permits adjustment which is not incompatible with the accuracy required for duplication of planes in longitudinal investigations.

The major problem involved in longitudinal studies on frontal planes is posed by the anteroposterior growth of the head forward of the meati of the ears. This growth would result in a gradual increase in the distance between the film and the earpost level. Growth studies would be possible only if the successive films represented the same anatomical plane.

I am indebted to Dr. Allan G. Brodie for the suggestion that the original focal plane be used throughout the entire range of investigation on any individual and that the frontal plane of choice would be that which passes through the pterygomaxillary fissure and the coronal suture. Both of these are readily discernible on a correctly oriented lateral headplate, and the distance of the plane anterior to that of the auditory meati (porion) can be measured. Thus it would be necessary only to allow for complete growth when establishing the original focal plane. Longitudinal studies will be necessary to substantiate this procedure.

Aside from the applications of cephalometric laminagraphy to longitudinal investigations of the growth and development of the human head, there appear to exist additional applications and implications:

The anthropologist may add factual knowledge to his storehouse of measurements on the human head.

The anatomist may find academic application for laminagrams in the presentation of cross-sectional anatomy of the skull.

The otolaryngologist, through improved visualization of sinuses and air passages, may aid his diagnosis and treatment of certain pathologic conditions of these structures (Figs. 11, 12, and 17).

The pediatrician and pedodontist may find much of practical value in the use of laminagrams to learn the nature of eruption patterns of the human teeth and the maturation phenomena of the skull of the growing child (Fig. 14).

Utilizing cephalometric laminagrams, the prosthodontist might well investigate the effect of denture placement upon the temporomandibular articulation. From such studies information may be obtained whereby new techniques of denture construction might be developed. (Fig. 13.)

The oral surgeon may employ laminagrams as an adjunct in dealing with the problems of localization of impacted third molars in the buccolingual aspect, the localization of foreign bodies, and in improved visualization of fractures, cleft palates, and certain pathologic conditions of the temporomandibular articulation. (Figs. 13 and 17.)

Finally, the orthodontist may gain information relative to those alterations in the frontal plane which may be the result of growth or the direct result of orthodontic intervention.

Although present laminagraphic apparatus is relatively recent in design it would appear that the possibilities of application for the advancement of scientific knowledge are extensive.

SUMMARY

1. Laminagraphy is explained and applied with existing cephalometric techniques to produce cephalometric laminagrams.

2. The apparatus requisite to the production of cephalometric laminagrams may be classified in two principal groups: (1) essential apparati and (2) accessory instruments.

The essential apparati comprise:

1. Laminagraph with tube furnishing relatively small (1.5 mm.) focal spot and standard energizing apparatus with its control panel.
2. Headholding device.
3. Projection scale and accurate rules.
4. Head measuring calipers.
5. X-ray films and equipment for processing them.

The accessory instruments comprise:

1. Horizontal tracing table or viewing box.
2. Fine pointed dividers.
3. Drawing instruments.
4. Tracing film.
5. Miscellaneous adjuncts.

3. A critical test was conducted upon the laminagraph to evaluate the accuracy with which the focal plane may be selected and to determine the thickness of the focal plane rendered.

4. The material upon which this investigation was conducted comprised:

1. Infant material from the Pediatrics Department, Research and Educational Hospital, University of Illinois, Chicago, Illinois.
2. Normal adult material volunteered by the graduate students of the Department of Orthodontics, University of Illinois, class of 1948.
3. An adult cleft palate was volunteered by one of the author's patients.

5. Laminagraph exposure factors are enumerated and described:

1. Factors unique to laminagraphy.
2. Conventional exposure factors as employed in laminagraphy.

6. Measurements were made of certain dental structures in laminagraphic projection utilizing a projected scale. Actual measurements of the same struc-

tures were taken upon dental casts of the same individuals. These measurements were compared to determine the accuracy of this method for cephalometric purposes.

7. Suggestion is offered pertinent to the standardization of apparatus positioning, of patient positioning, and of exposure technique so as to make practicable the application of cephalometric laminagrams to longitudinal investigations on the growth of the human head.

8. The detailed technique for producing cephalometric laminagrams was given in summation.

REFERENCES

1. Adams, J. W.: Correction of Error in Cephalometric Roentgenograms, Angle Orthodontist **10**: 3-13, 1940.
2. Andrew, F. D., and Warren, S. L.: A Study of the Distortion in Roentgenograms Taken at Various Target Distances, Am. J. Roentgenol. **22**: 332, 1929.
3. Andrews, J. Robert: Planigraphy. Part I. Introduction and History, Am. J. Roentgenol. **36**: 575-587, 1936.
4. Andrews, J. Robert, and Stava, R. J.: Planigraphy: Roentgenographic Representation of Plane Sections of Solid Objects. Part II. Mathematical Analysis of the Methods, Description of the Apparatus, and Experimental Proof, Am. J. Roentgenol. **38**: 145-151, 1937.
5. Angle, Edward H.: Malocclusion of the Teeth, ed. 7, Philadelphia, 1907, The S. S. White Dental Mfg. Co., p. 89.
6. Broadbent, B. Holly: A New X-ray Technique and Its Application to Orthodontia, Angle Orthodontist **1**: 45-66, 1931.
7. Broadbent, B. Holly: Bolton Standards and Techniques in Orthodontic Practice, Angle Orthodontist, vol. 7, no. 4, 1937.
8. Broadbent, B. Holly: The Face of the Normal Child, Angle Orthodontist, vol. 7, no. 4, 1937.
9. Brodie, A. G.: Some Recent Observations on the Growth of the Face and Their Implications to the Orthodontist, Am. J. Orthodontics and Oral Surg. **26**: 741-757, 1940.
10. Brodie, A. G.: On the Growth Pattern of the Human Head From the Third Month to the Eighth Year of Life, Am. J. Anat. **68**: 212, 1941.
11. Brodie, A. G.: On the Growth of the Jaws and Eruption of the Teeth, Angle Orthodontist, vol. 12, no. 2, 1942.
12. Brodie, A. G., Downs, W. B., Goldstein, A., and Myer, E.: Cephalometric Appraisal of Orthodontic Results. A Preliminary Report, Angle Orthodontist, vol. 8, no. 4, 1938.
13. Bush, G. B.: Some Experiments in Tomography, Brit. J. Radiol. **2**: 611-622, 1938.
14. Downs, W. B.: Variations in Facial Relationships: Their Significance in Treatment and Prognosis, Am. J. Orthodontics **34**: 812-840, 1948.
15. Elsasser, Wm., and Wylie, Wendell: Design, Construction, and Application of a Compensator. (Unpublished material—personal communication, 1947.)
16. Files, G. W.: Medical Radiographic Technique, ed. 1, Springfield, Ill., 1946, Charles C Thomas.
17. Kieffer, Jean: The Laminagraph and Its Variations. Applications and Implications of the Planigraphic Principles, Am. J. Roentgenol. **39**: 497-513, 1938.
18. Kieffer, Jean: Body Section Radiographic Technique, X-ray Technician **2**: 12-16, 1939.
19. Kieffer, Jean: Analysis of Laminagraphic Motions and Their Values, Radiology **33**: 560-585, 1939.
20. Kieffer, Jean: The General Principles of Body Section Radiography, Radiography and Clinical Photography **19**: 2-10, 1943.
21. Moore, Sherwood: Body Section Roentgenography With the Laminagraph, Am. J. Roentgenol. **39**: 514-522, 1938.
22. Pacini, A. J.: Roentgen Ray Anthropometry of the Skull, J. Radiol. **3**: 230-237; 322-331; 418-426, 1922.
23. Twining, E. W.: Tomography by Means of a Simple Attachment to the Potter-Bucky Couch, Brit. J. Radiol. **10**: 332-374, 1937.
24. Ziedses des Plantes, B. G.: A Special Method of Making Roentgenograms of the Cranium and Spinal Column, Nederl. tijdschr. v. geneesk. **75**: 5218-5222, 1931.

1115 Walnut Street.

THE SIGNIFICANCE OF PROPER MECHANICAL THERAPY IN ORTHODONTIC TREATMENT

GEORGE NAGAMOTO, D.D.S., M.D.Sc.,* KANSAS CITY, MO.

I DEEPLY appreciate the honor and privilege of presenting some of our mutual problems to this progressive group.

Our specialty, no doubt, is one of the most dynamic in the field of health service. It is, however, alive with so many bewildering ideas that the students of this exacting work constantly find themselves in the midst of great confusion. And by the term "students" I imply that we should all fall into this category. It was the late Dr. G. V. Black who so aptly stated, "The professional man has no right to be other than a continuous student."

What are the facts associated with the current controversies in orthodontics regarding:

1. The age at which treatment is instituted.
2. The extraction of teeth.
3. The reason for frequent relapse of cases.
4. The response of basal bone growth to mechanical stimuli.

I believe you will find that all four of these problems are closely related to diagnosis, treatment planning, and mechanical therapy, but actually based upon the physiobiologic knowledge. In 1933 Oppenheim[1] reported his findings upon monkey experimentation, which was one of the greatest contributions toward modern orthodontics. He had continued his great work until his death in 1945, and left us with the priceless knowledge concerning biologic phases of tooth movement.

The experiments performed by Johnson, Appleton, and Rittershofer,[2] using resilient lingual finger springs applying continuous mild pressure, seemed to have brought about a favorable tissue reaction which was fully described in Oppenheim's histopathologic material, the bone spicules arranging themselves parallel to the direction of force without evidence of extreme injury or necrosis of the periodontal membrane. In all this research, the evidence of bodily and more permanent movement of teeth was brought about by *light continual forces.* These scientific findings then became the basis of orthodontic tooth movement.

So with these thoughts in mind concerning our orthodontic problems, let us go on to the subject of "Age of Treatment." Concerning this subject of age at which patients should be treated, only the individual patient presents an answer to this all-important question.

Physiobiologic factors must always be considered in the age problem, as well as in the matter of extraction. Physiology, dealing with the function of the organs, and biology, being the science of the living organism, we are involved with

Presented at the meeting of the Southwestern Society of Orthodontists, Wichita, Kan., Feb. 2, 1948.

*Professor of Orthodontics, University of Kansas City, School of Dentistry.

these two studies in all the phases of our orthodontic problems, in addition to the mechanical principles.

If and when we discover that etiology of malocclusion for the most part lies in an inherent growth pattern, then our approach to training and educating of the future orthodontists must be revised to teaching more of the specialty of genetics and other basic science subjects. However, at the present time I still feel that the orthodontist's problems must be realistically faced and the scientific manipulation of mechanical force based upon physiobiologic factors stressed. It still seems remote that we can attribute the causes of most malocclusion to hereditary factors alone.

It is true that we cannot overtreat any patient beyond the limit of tissue tolerance, which perhaps is governed largely by predestined growth factors. It must be possible, however, to remove many of the acquired and environmental causes of dentofacial anomalies and to restimulate the latent activity of the developing dentures.

We must acknowledge that the greatest service and remedial procedure in our specialty is to guide the dentofacial well-being of our patient. This must be accepted in the light of preventive measures, the most worthy type of health service in any healing profession.

As such, there is no excuse for a conscientious and well-meaning orthodontist to ignore or neglect the case before him, even though the expediency of treating it later is apparent. Sir William MacEwan[3] stated:

> The younger the animal, the greater is the proliferating power of the bone cell, and the longer will it continue to proliferate before it assumes its mature form; consequently, the greater is the ossific production.
>
> The proliferating power of the osseous tissue of old animals is greatly reduced compared with those of animals in the evolutionary period, and the osteoclasts which are poured out from them pass quickly into their mature form.

With a very mild stimuli many patients with mixed dentition or even deciduous dentition can be treated for the best result during these periods. Due to convenient bite or bad habits, we often find cases becoming potential Class III malocclusions if not corrected early. Again, they may be cases of cross-bite relation of the first molars, in which case if neglected the other erupting teeth will often result in poor alignment.

The subject of extraction has been discussed so much in recent literature and at various meetings that I feel reluctant to spend too much time on it. Yet, it bears such an important relationship to my topic of "proper mechanical therapy" that I cannot afford to dismiss it entirely without a few words of explanation.

The extraction of teeth in orthodontics is not a new procedure by any means, for its history dates back to Bernard Bourdet (1757),[4] almost two hundred years ago, who at that time advocated extraction of two maxillary premolars to allow room for the canines. When the arches were too large, he advised extraction of all first premolars. Again, in children with protruded chins, he extracted mandibular first molars shortly after their eruption.

In the beginning of the twentieth century, much controversy took place between Calvin Case and Martin Dewey, and so we are pondering over age-old questions. However, very few men seem to view this subject in the light of new and more efficient appliances and diagnostic means. Certainly, we cannot be indifferent to the fact that perhaps some modifications of thought exist if we are to use some of our recently developed appliances based on newer scientific findings.

In grouping the types of malocclusion being treated today, most likely the Class II, Division 1 case predominates. Therefore, let us consider this type for discussion. Angle's classification merely describes the first permanent molar relationship, but does not inform us whether the maxillary arch is in protraction or the mandibular arch is in retraction. At this point, may I quote James McCoy[5]:

> . . . any classification, to prove adequate, must be predicated upon sufficiently broad principles, so that all the definite characteristics of anomalies may be encompassed by it. Dental occlusal deviations are but one of the several lesions of such conditions, and to assume that a comprehensive picture for the total involvement may be foretold by such relationships is not only lacking in logic but without a foundation in fact.

If it is the former condition, namely, a maxillary protraction, frequently you will find a generally well-developed lower arch and fairly well-aligned mandibular teeth. Any attempt to overdevelop such an arch may be futile. The relationship of the mandibular denture to cranial structures may be correct. The approach to the problem in such cases is to bring the entire maxillary dentoalveolar structure posteriorly, or customarily to extract either the two maxillary premolars or second molars, depending on the case. If the condition is a mild one, the maxillary posterior teeth may be moved distally, followed by the distal movement of the anterior teeth.

If, however, a Class II, Division 1 type case presents a mandibular retraction, we can obtain a certain degree of success in developing the mandibular dentoalveolar structures forward. It would be the height of folly to advocate extraction of the lower premolars in such condition when all evidence exhibits the lack of space for the tongue and shows the improper dentocranial relationship of the lower arch. Figs. 1 to 7 show an extreme case of this type treated by me and finished by Dr. Sydney Cross.

To be led by a wave of one-sided hysteria for extraction or, the other extreme, for nonextraction, whenever such is contraindicated, is neither scientific nor practical in our treatment. My bewilderment in trying to analyze why some men are so swayed first one way, then another, makes me feel that their opinions are not supported by any of the modern diagnostic procedures.

Regarding extractions, I would like to quote from Salzmann[6]:

> Extraction is at present growing in favor as an adjunctive procedure in orthodontics. With the search for quick methods to meet the growing demand for orthodontic treatment, especially in impending socialized, prepayment, or other schemes for mass dental care, there is danger that extraction may actually be accepted by the general practitioner not as an adjunct in selected cases where it is especially indicated, but as an independent therapeutic measure to replace mechanotherapy in orthodontic procedure.

Fig. 1.

Fig. 2.

Fig. 1.—Patient, aged 10, before treatment was started.

Fig. 2.—Patient at the age of 17, one year after treatment was completed. The patient had also undergone plastic surgery of the nose.

Fig. 3.—Left photograph shows the boy at the age of 16 immediately after the completion of the treatment. The right picture shows the profile of the boy at the start of the treatment.

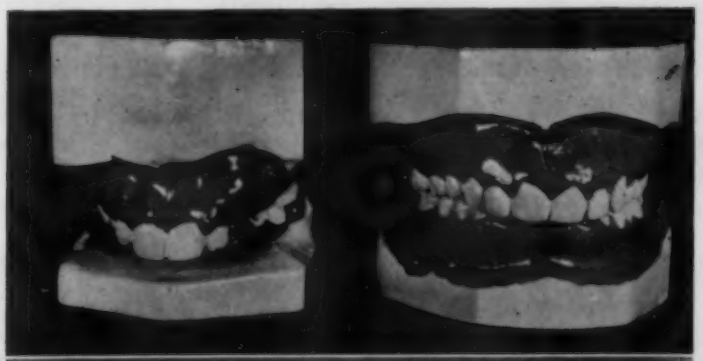


Fig. 4.

Fig. 5.

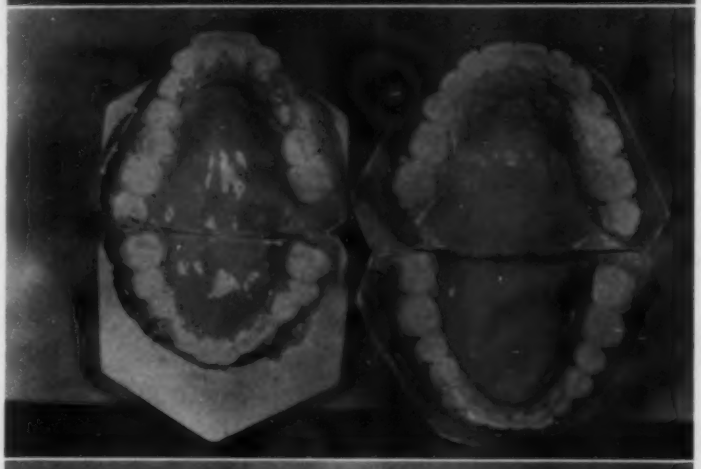


Fig. 6.

Fig. 7.

Fig. 4.—The case as viewed from a labial aspect.

Fig. 5.—The case as viewed from a lateral aspect.

Fig. 6.—The case as viewed from an occlusal aspect.

Fig. 7.—The left photograph shows a cross section of the lower cast at the beginning of the treatment. Notice the inclination of the mandibular incisors and compare it with the right picture showing the verticality of the tooth after being moved forward bodily.

And to quote Lowrie J. Porter[7] from his commendable paper:

> I do not believe that even Dr. Tweed and Dr. Strang are definitely sure that the future trend in orthodontic therapy will warrant the high percentage of extraction which has been suggested. . . .

Fig. 8.

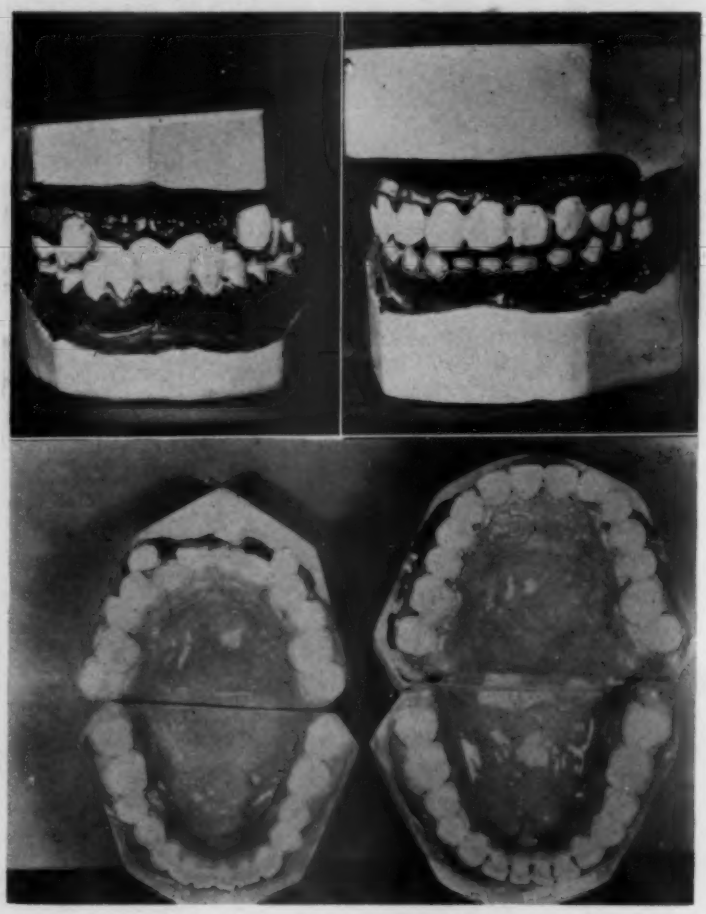


Fig. 9.

Fig. 8.—Labial aspect showing the cast (right) thirty-three months after treatment.
Fig. 9.—Occlusal aspect showing the cast (right) thirty-three months after treatment.

In the editorial section of the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY[5] in which it quotes from *Dental Items of Interest,* December, 1944:

> ". . . treatment standpoint orthodontia is just where it was fifty years ago." The impression was given that orthodontics is about finished, and that general practitioners, in the past, by extracting teeth in treatment, have made more progress in a practical way, with less ostentation and fanfare than have the orthodontists.

So let us be judicious in our decision when to extract; let us utilize all modern diagnostic facilities in order to justify this action.

In regard to the frequent relapse of treated cases and the response of basal bone growth to mechanical stimuli, I believe if we can apply our orthodontic appliances in a definitely controlled and directed tooth movement and subject the tissue to a mild, continual force, not an extreme, sudden pressure, we will be able to accomplish the positioning of the teeth with the least amount of relapse as shown in Fig. 7.

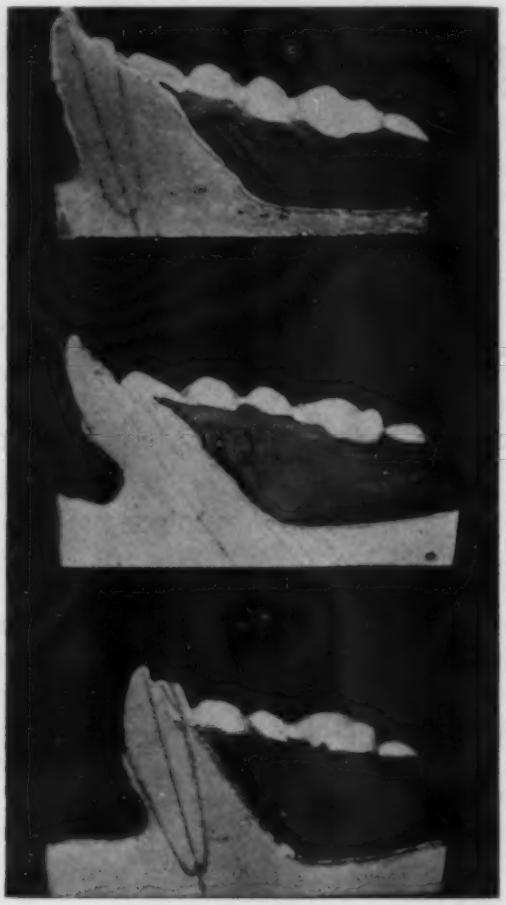


Fig. 10.—Cross section of the maxillary casts at the start of the treatment (upper), at the completion of the treatment period of thirty-three months (middle), and twelve years after the completion of the treatment (lower). Note the improvement in the axial inclination of the teeth and the increase in the supporting structures as shown labiolingually.

As to the basal bone response to orthodontic stimuli, one cannot help but question whether those incisors could be supported in the new position without some alteration in the basal bone or apical base as shown in Fig. 7. In Figs. 8 to 10 is shown another interesting case which seems to indicate the significance of proper mechanical therapy (mild continual force) which tends to bring about a favorable tissue response even though the tipping movement had taken place during the "jumping of the bite." The treatment period was thirty-three months. The active appliance was Mershon's lingual auxiliary springs.

And now a few remarks relative to diagnosis. Time and again I have seen men with years of experience casually glance at a patient's mouth or unoriented

casts and immediately make a decision of removing four first premolars. Often a suggestion of moving the maxillary posterior teeth distally, developing the lower anterior segment labially, or a general development of the arch brings forth a curt denial that it can be done.

These are but the indications of how important proper diagnostic procedures are in our present-day orthodontic practice. It is unnecessary for me to occupy your time discussing this subject, since you will find a very comprehensive article written by C. F. Stenson Dillon[8] in the September, 1945, issue of the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY. But I should like to quote a few lines from him. He said:

> Then, too, there are the squint and guess methods employed only too liberally. In any event there must be some pre-conceived idea in mind before the diagnosis or comparison may be made.

If we can carefully survey each case in which extraction may be indicated or in which development of the arch possible to accommodate all teeth may be obtained by present-day diagnostic procedures, such as oriented casts, photostatic photographs, cephalometric roentgenograms, plus careful visual analyses, I am sure we can usually come to a more logical diagnostic conclusion. Too often, however, snap judgment is made without resorting to any scientific form of diagnostic procedures. To quote from Higley[9]:

> Some have assumed that an artistic sense, plus previous experience and an unoriented cast of the teeth are all that is necessary to satisfy their diagnostic ambitions.

Through the great contributions of men like Oppenheim, Schwarz, Gottlieb, and many others, there should be no doubt regarding the ability of alveolar bone to respond to mechanical therapy. We have yet, however, to determine whether or not this reaction takes place in the basal bone or just in the alveolar structures.

And so we are in the midst of conflicting opinions regarding the basal bone reaction to mechanical forces. I believe we are often using force much greater than anything resembling physiologic stimuli. It is encouraging, however, that by utilizing appropriate appliances for each case, together with technical precision, many satisfactory cases result in orthodontics.

The primary interest of our patient (or their parents) is that of esthetics. However, we as orthodontists are concerned in affecting better dentofacial relationships, and strive toward obtaining a pleasing and permanent result. In our efforts to eliminate relapses, let us not obscure one of the most important factors, that of tissue tolerance. I have already dwelt extensively upon this subject, indicating more favorable response of tissue in earlier childhood. Since we are dealing with the physiobiologic problems, aided by mechanical therapy, we should depend upon the biologic proof rather than resort to rampant extraction in accelerated treatment.

We have come a long way from the first inception of orthodontic treatment, dating back to 400 B.C., and the more modern phases of it since 1900. Many of us may be at the crossroad of deciding whether we choose to keep up the pace of studying, learning, and performing the orthodontic treatment in the light of improved and correct diagnostic facilities and treatment procedures.

We still do not have a universal appliance in the true sense of the word; some appliances may be rigid and well controlled but too forceful for physiologic tooth movement. Others may be flexible but not applicable for a certain type of case; many times one or the other cannot be used in mixed dentition. This, however, does not justify the postponement of such treatment to satisfy the usage of such appliances later. An appeal to the fair mind should eliminate all prejudice toward any appliance, and fit the appliance to the case rather than fit the case to the appliance.

The evolutionary changes in the appliances must be accepted when better results produced by them are apparent. This is only the logical step in line with our newer concept of the basic sciences in orthodontics. In the evolution relative to this important specialty, amazing progress has been made, both in mechanical appliances and in knowledge of the basic sciences. These are the products of much labor and sacrifice by our men of science. Let us remind ourselves of that quotation from the immortal Emerson: "We are the fruits of Time, and owe all to immeasurable Past. . . ."

From labial and lingual arches of Lefoulon in 1841 to McCoy's open-tube labial and Mershon's lingual arch wires and their modification, the Oliver labiolingual arch wires, Angle's edgewise arch, Atkinson's universal appliance and its much modified type, the Johnson twin arch, and many other new types of appliances, the present-day orthodontists have very effective appliances at their command. However, I believe there is no appliance today which can be the most efficient in all types of cases. With all due respect to many of our intraoral appliances, there are some cases which will benefit much by the use of extraoral anchorage.

The progress and advancement of our profession, especially in regard to the facilities for determining accurate diagnosis, etiology, treatment planning, plus the efficiency of present-day appliances, should stimulate and encourage every one of us to use and to apply these newer means. This is no time for prejudice over the origin of a certain appliance or diagnostic aid, but a time to accept and measure their efficiency in the light of present-day orthodontics.

As both Mershon[10] and Dewey[11] have stated:

> Biology cannot be worked out by mathematical formulae . . . you cannot regulate teeth by mathematical rules or calculations.

By the same token I feel you cannot set an ideal arch for each individual based upon any geometrical pattern but must allow nature to decide when, where, and how much the tooth will move in response to mild mechanical stimuli. As stated by Oliver[12]:

> We are not qualified to pre-determine each form consistently with inherent growth in every case.

REFERENCES

1. Oppenheim, Albin: Tissue Changes During Mechanical Tooth Movement, INT. J. ORTHODONTIA 19: 1178, 1933.
2. Johnson, A. Leroy, Appleton, J. L., and Rittershofer, L. S.: Tissue Changes Involved in Tooth Movement, INT. J. ORTHODONTIA 12: 889, 1926.
3. Sir William MacEwan: The Growth of Bone, Glasgow, 1912, James Maclehose and Sons, p. 198.

4. Weinberger, Bernhard Wolf: Orthodontics, An Historical Review of Its Origin and Evolution, St. Louis, 1926, The C. V. Mosby Company, vol. I, p. 152.
5. McCoy, James D.: Applied Orthodontics, Philadelphia, 1941, Lea & Febiger, p. 52.
6. Salzmann, J. A.: The Rationale of Extraction Adjunct to Orthodontic Mechanotherapy and the Sequelae of Extraction in the Absence of Orthodontic Guidance, AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURG. 31: 181, 1945.
7. Porter, Lowrie J.: Conservatism in Orthodontic Procedures and Appliances, AM. J. ORTHODONTICS AND ORAL SURG. 33: 109, 1947.
8. Dillon, C. F. Stenson: Orthodontic Diagnostic Procedures, AM. J. ORTHODONTICS AND ORAL SURG. 31: 458, 1945.
9. Higley, L. B.: Assumptions Concerning Orthodontic Diagnosis and Treatment, AM. J. ORTHODONTICS AND ORAL SURG. 33: 738, 1947.
10. Mershon, J. V.: Physiology and Mechanics in Orthodontia, Dental Cosmos 10: 1197, 1922.
11. Dewey, Martin: Anchorage and Attachment, INT. J. ORTHODONTIA AND ORAL SURG. 5: 693, 1919.
12. Oliver, Oren A.: The Rationale of the Labiolingual Appliances in Present-Day Orthodontic Treatment, AM. J. ORTHODONTICS AND ORAL SURG. 31: 381, 1945.

GENERAL PRACTITIONER'S DESIRED COOPERATION WITH THE ORTHODONTIST

ARTHUR E. CORBY, D.D.S., NEW YORK, N. Y.

ORTHODONTICS, as I have defined it, is the following:

Orthodontics is the specialty which deals with the prevention and correction of abnormal relations of the teeth and jaws and of resultant facial anomalies. The orthodontist prevents and corrects such abnormalities by producing functional tooth relationships which are within the normal growth limits of the bones and muscles of the jaws and face. Tooth movement is limited by the amount of bony development of the jaws and the relationship of opposing muscle pressures. Tooth changes produced by mechanical appliances or by the correction of abnormal habits are held in place for a sufficient period of time to allow for bone growth and muscle changes, since the stability of orthodontic results depends upon nature in bone production, general health and normal functioning of muscles.

Dr. J. A. Salzmann in his monumental work entitled *Principles of Orthodontics*, in referring to the scope of orthodontic practice, stated the following:

Orthodontics is directly or indirectly concerned with the prevention, alleviation, elimination and correction of dentofacial anomalies. The practice of orthodontics may deal directly or indirectly with the alleviation or elimination of any one or more of the following:

1. Impairment of masticatory function.
2. Reduction of susceptibility to dental caries.
3. Elimination of periodontal disease and other affections of the oral tissues due to malocclusion.
4. Improvement of esthetics of facial appearance.
5. Correction of dentofacial abnormalities of genetic, congenital and environmental origin, including those resulting from surgical intervention.
6. Correction of shifted teeth prior to the construction of partial dentures.
7. Elimination of abnormal respiratory habits.
8. Elimination of harmful dentofacial habits.
9. Correction of temporomandibular abnormalities.
10. Correction of abnormal mental attitude in relation to dentofacial esthetics.

Most of the items mentioned are of direct interest to the general practitioner, and in the ordinary course of events these conditions are first seen and appraised by him. In some cases the pediatrician might be the first one to recognize the necessity for corrective measures, or perhaps the psychiatrist might be called in to attempt to prescribe the remedy for the correction of certain emotional disturbances responsible for a variety of habits in relation to the teeth, face, or most any part of the anatomy. Thumb-sucking might be merely a symptom of a vague emotional disturbance, the origin of which might be difficult to trace.

Preventive dentistry is as much a responsibility of orthodontists as it is of general practitioners and, in order to assume fully their share of this public responsibility, it seems incumbent upon the men who practice orthodontics to educate the general practitioners and physicians, as well as the public, regarding their ability to correct the various abnormalities contributed by Mother Nature.

Presented before the Northeastern Society of Orthodontists, Nov. 23, 1948.

In the twenty-five years since Lundstrom first stated his conclusion that "The occlusion is not able to control the apical base, while on the other hand, the latter is in a high degree capable of affecting the occlusion," orthodontists in general, both through clinical experience and research investigation, have come to the realization that the repositioning of teeth by means of appliances affects only the alveolar process and does not affect the basal support of the dental arches.

Last year Ashley Howes graphically demonstrated that the maxillary basal arch achieves its full width in the premolar region at an early age and that neither orthodontic expansion of the dental arch nor reduction of tooth material by extraction affects the width of this basal arch to any significant degree.

This so-called new concept more nearly approaches my own findings and deliberations in relation to the psychological influence of the emotions, plus heredity and environment, over the physical forces of the body.

Psychiatrists are aware of the influence of the emotions in everyday life on the normal processes of the body, the tendency to such alterations leading to diseased conditions, many times of a chronic nature. These ailments in the past resisted all treatment, but today in the study of psychosomatics we are collecting data of a very important nature which we hope will some day help us to solve the mystery of many diseases, now somewhat vaguely understood.

What part do the emotions play in the causation of cancer, arthritis, pernicious anemia, leucemia, and other diseases?

In 1933 in an article on psychosomatics, not so-called at that time, I stated that dental decay, as well as periodontoclasia, in my opinion, is a symptom of abnormal complex nerve reflexes, caused by a disturbed mental state, altering the quantity and the chemical composition of the fluids of the body.

It is further my opinion that every abnormality of form not caused by destructive disease, or certain accidents, has been brought about by the influence of the thought processes. The binding of the feet and the development of the jaws in the Eskimo due to their chewing of the leather for sewing are naturally to be excepted.

Hate, fear, anger, worry, and like sinister emotions react through the sympathetic nervous system, adversely influencing the proper functioning of the entire body, particularly the glands of internal and external secretions, the arterial and lymphatic systems.

Due to environment or otherwise, certain family characteristics developed over a period of centuries, so influence the physical appearance of the body, that succeeding generations reveal this irregularity. It would seem that as great a period of time will be necessary under more favorable circumstances, to cause the corrective emotional outlook gradually to influence the shape of the body toward the favorable more average type. Of course the opposite might occur, so that abnormalities might increase instead of disappear.

In the beginning man was perfect—in the image of God—and we are now searching for the culprit who is responsible for the various types of malocclusion and abnormalities. The Bible does say that the sins of the fathers shall be

visited upon the children unto the third and fourth generation. Nothing, however, was said about the mothers—they must have been perfect. Had we all behaved ourselves from the beginning we would all now look like Miss and Mister America with perfect face and form.

A person with an inherited neurotic tendency is nearly always possessed of rather slender, long, thin bones rather than broad and thick-set as in the more phlegmatic type. The face is constricted; the pressure of the muscles of the face and the entire mental attitude is one of constriction and tensity, thereby putting pressure on the buccal side of the jaws and teeth, causing constricted arches. The mouth is often ajar, but in later life many of these people, through the accumulation of this great amount of emotional stress, frequently resort to bruxism, unconsciously or otherwise.

Conversely, squat individuals, relaxed and phlegmatic, have broader bodies and bones and are slower in their movements. Their tendency is to have a broader arch, as the tongue is relaxed and exerts the right amount of pressure; the jaws exert greater force during the process of mastication, and the pressure of the muscles of the face is better equalized.

I have been a great admirer of Leuman Waugh's unsurpassed research work with the Eskimos, and I do feel that the eating of candy played a very great part in the destruction of their teeth. I feel, however, that the effect of the emotional disturbance on the Eskimo when in contact with civilization, such as his first sight of an automobile, his first contact with a telegraph instrument, money, different clothing, different food, manufactured articles, language, dress, and other strange things, undoubtedly so confused his mind that for many nights and days his simple thoughts must have been greatly disturbed, severely interfering with the normal functioning of his entire body, reducing the normal bodily resistance.

I can well see that unless one can divorce his own nature and inherited characteristics through practice and the formation of different habits, the characteristic bone, arch, and teeth are his forevermore, and not too great a change can be hoped for.

These inherited and acquired undesirable characteristics seem to be carried on through the male and female germ cells and transmitted to many generations. These adverse factors can only be ultimately eliminated by the education of the individuals along other lines to bring about a change through the thought processes, and also through marriage, so that the pattern is eventually altered.

One can see these characteristics in the various races on this earth, and no doubt it will take eons to bring about substantial changes.

Cavity Detection.—Although many means have been suggested for the location of cavities, including the x-ray, nevertheless in many cases of incipient caries it is most difficult to be entirely sure.

It is also difficult to locate leaky fillings, particularly amalgam fillings that have been in the teeth for a number of years. In securing an x-ray in many cases the metal is superimposed on the area of decay and so prevents its detection. It seems to me that I rarely remove an old amalgam filling without finding at

least some evidence of decay. Of course, we are dealing primarily with young children in our discussion, and the fillings, if any, have not had that long period of wear.

Many methods have been suggested for the proper liaison between the orthodontist and the general practitioner, so that the patient may be fully protected from the development of cavities beyond the initial stage; but it is extremely difficult to work out a method satisfactory in all cases, and to all men. It is not within my province to prescribe a method, but merely to suggest a possible solution from my point of view.

I do not feel that the orthodontist encroaches on the field of the general practitioner if he takes x-rays of the patient's mouth and teeth. Some orthodontists, in their effort to avoid offending or encroaching on what might seem to be the domain of the general practitioner, either refer the patient back for x-rays or call him up and suggest that he take the x-rays. It is a very kind thought, but after all we are primarily interested in what is best for the patient; surely the orthodontist should know the type of picture that he desires and the most favorable angle in order to arrive at a satisfactory diagnosis.

It frequently happens during the course of orthodontic treatment that the gums become inflamed and swollen and when brushed or touched with an instrument bleed rather freely. This condition is rather similar to trench mouth or Vincent's infection; in fact, it presents a somewhat similar appearance if a smear is placed under the microscope.

The causative factors are much the same, as the gums are mechanically irritated by the bands or appliances. Similar types of irritation are brought about by ill-fitting crowns or fillings in adults. Furthermore, many children fail to keep their mouths clean, and with the decomposition of food particles these cases resemble very closely the type sometimes referred to as schmutz pyorrhea. Many other factors contribute to the onset of bleeding gums, such as lowered resistance due to a febrile condition or some psychosomatic involvement.

It seems to me to be within the province of the orthodontist to treat any gum condition which might be due to the irritation of an appliance, as he is in a better position to understand its nature.

In cases of bleeding gums, about the most effective treatment in my hands is an aqueous solution of mercuric cyanide, between 1-100 to 1-3,000 sparingly applied. The 1-3,000 dilution may be applied to the eye without irritation. The technique, however, should be well understood before it is used.

After the diagnosis has been made clinically, with perhaps the aid of the x-ray and microscope, corrective measures should be instituted to remove the cause. Often no further treatment is necessary, but in cases of persistent bleeding and failure to respond to the usual methods, it is suggested that a solution of mercuric cyanide be used as an aid in treatment, due to its powerful germicidal qualities, its efficacy in ridding the mouth of the Vincent and virtually all other organisms. In certain cases I have found just a few spherical organisms to be the sole survivors. Mercuric cyanide is never injected into the

tissue, but is used merely to flush the gingival crevices or interdental spaces. So used, it will in a very short time restore the light pink color of normal gingival tissue.

I am definitely opposed to the use of caustic drugs on the delicate soft tissues of the mouth for any dental purpose. To my way of thinking they are not only unnecessary, but positively harmful. These produce scar or low-grade tissue. For the same reason I am definitely opposed to electrical coagulation or cautery.

Chemistry.—Mercuric cyanide, $Hg(CN)_2$, is a poisonous salt which should be kept in well-stoppered, dark amber-colored bottles.

> This occurs as colorless or white, prismatic crystals, and having a bitter metallic taste, becoming dark-colored on exposure to light. Soluble, at 15° C. in 12.8 parts of water, and in 15 parts of alcohol in 3 parts of boiling water, in 6 parts of boiling alcohol; very sparingly soluble in ether. (U. S. Dispensatory, 1937.)

The percentage of acidity of mercuric cyanide has been found to be 0.065 of 1 per cent; in other words it has just a slight trace of acidity. It might be well to keep your aqueous solution of mercuric cyanide in a bottle somewhat distinctive in design for ready differentiation or to color the solution.

Toxicology.—The toxic action of mercuric cyanide resembles that of the chloride and not that of the cyanide salt. This action of mercuric cyanide may be due either to its small degree of ionization or to the isometric structure $Hg(CN)_2$ which has been ascribed to it by some authors.

A series of tests on guinea pigs for toxicity were conducted for me by Dr. H. F. Smyth at the School of Hygiene, University of Pennsylvania, Medical Department, with the following conclusions:

> The smallest dose proving fatal to a guinea pig was 1 mg. per 100 Gm., equivalent to about 75 mil. or c.c. of a 1 per cent solution for a 150-pound person.
>
> The greatest amount used in a patient's mouth at any one treatment is 2 mil. of a 1 per cent solution, and the patient is instructed to expectorate carefully; hence very little of this solution is swallowed.
>
> It apparently has no action on normal tissue and its effect on metallic restorations in the mouth if any cannot be detected.
>
> Any trays or instruments made of aluminum should not come in contact with mercuric cyanide.

Treatment.—Under certain conditions, as in the case of children, the application of this drug is necessarily limited to a cotton applicator. In older persons, after the initial cleansing, the following technique is applied:

> By means of a dull, slightly flattened, flexible iridioplatinum needle attached to a glass syringe (Luer type), carefully trace the gingival crevices or troughs, depositing a drop of warm mercuric cyanide in each and giving always special attention to the interdental spaces. Press the plunger gently. Never force the solution. Not more than 2 mil. of a 1 per cent aqueous solution of mercuric cyanide should be used at any one treatment. Up to a dilution of 1-3,000, most startling results are obtained. A solution of 1-3,000, 1-2,000, or 1-1,000 on a swab is recommended for children.

I have been in the habit of giving my patients two malted milk tablets after each treatment to dissolve in the mouth, as a precautionary measure in case they might carelessly have swallowed a considerable quantity of the solution—milk being an antidote.

Sodium Fluoride.—The use of sodium fluoride for the prevention of dental caries has received a great deal of publicity in the professional journals as well as various lay periodicals and newspapers.

The leading investigators and scientists have made reports at intervals regarding the progress of their investigations. Fluorine has been put into the public drinking water in order that its efficacy in the reduction of caries might be determined on a large scale.

Have the orthodontists considered its use just previous to the cementation of bands or the use of appliances which might impinge on the teeth? I know that some men have been following this practice, but I am wondering whether it is a generally accepted practice.

It might be stated that sodium fluoride is not effective after 14, according to the experts. However, whether we are to agree with Dr. Gottlieb or not, his method seems to apply to all ages and, if as effective as he claims, we have recourse to the use of his method for patients over 14.

This is a matter which might well form the basis for considerable research along the lines of caries prevention during the period of orthodontic treatment. This thought should not, however, encourage our orthodontic specialists to place too much confidence in either of these methods as yet. In the case of sodium fluoride, we must remember that the men who have done the most work on this method only claim a reduction of 40 per cent in the incidence of caries.

Occlusion.—The orthodontist is usually well grounded in his knowledge of occlusion, as proper corrective procedures would be rather difficult without this education. However, I am convinced that the general practitioner is rather hopelessly lacking in this special knowledge, and until his education is broadened along those lines his part in the recognition of malocclusion will not be fulfilled. He will not be able to recognize patients in need of treatment, and thereby will become a weak link in the chain, in an otherwise favorable combination of the general practitioner and the orthodontist.

Medical Profession.—I have the keenest regard, respect, and admiration for the medical profession, and we owe a great debt of gratitude to them for their untiring efforts in a great work, but we have found that the medical course is a bit sketchy in relation to the dental approach.

At this point I am going to dare to make a suggestion that an invitation be extended to members of the medical profession, particularly the pediatricians, by their dental friends, so that they might observe some of the work done by the dental profession, particularly the orthodontists. An occasional evening might be spent in the presentation of the best moving pictures or slides in relation to the various specialties of dentistry, presenting the important aspects of that specialty. This type of visual education can more readily and more quickly impart to the audience a knowledge of the problems of the dentist. This would not only help the alert and progressive medical man, but would also bring about a better liaison between the two professions for the benefit of mankind.

I am sure that the physicians would be much interested in the objectives of the orthodontist, the technical developments in the field of prosthetic dentistry, the field of the oral surgeon, crown and bridge prosthesis, and the developments

in periodontics, as well as the intricacies of some of the other branches. The progress along these lines would undoubtedly be of more than passing interest to our medical confreres.

I recall specifically a lecture by Allan Brodie on the position of the mandible which was held at the New York Academy of Dentistry. At this meeting I invited some medical friends of mine and they were fascinated by his talk.

After developing this subject in one of the dental societies, a suggestion might be made to the medical schools for the inclusion of such a course of visual education, with explanatory remarks for the benefit of the medical student and his better appraisal of the work of this allied profession.

For the benefit of the pediatrician and the orthodontist, a plan might be worked out for the harmonious cooperation between these men looking toward the accumulation of the best knowledge, so that the patient will be better provided for and a satisfactory diagnosis made early enough to obtain the maximum benefit.

Psychosomatics.—It has been said that the mind is mirrored in the face. My experience seems to bear out this statement, but I wish to go one step further and state that the mind is also mirrored in the teeth. Their position in the arch, their character and anatomy, their chemical structure, the nature and character of the supporting tissues, and the environmental fluids are governed by the mind. The influence of the emotions, heredity, and environment has a direct bearing, not alone on the teeth and surrounding structures as we see them at this very moment, but also on their constantly changing structure and nature, as well as their constantly changing position in the mouth.

Emotional stability is a grand desideratum, but where in this changing world can we find such a rarity? Since emotional stability makes for health of the teeth as well as the health of other parts of the body, it seems to me that this factor must be cultivated before we might hope to reach that point where decay, periodontoclasia, and orthodontic anomalies begin to disappear.

Under favorable conditions even the bone formation is heavier and fuller due to the fact that the nervous mechanism of the body is completely relaxed in the formation of the bone and muscle as well as the teeth. Furthermore, the completely relaxed and good-sized tongue expands and exerts pressure on the lingual surfaces of the teeth and bone. The long bones of the body are usually shorter and heavier. Conversely, the long bones of the body of a neurotic person or so-called nervous type are long and thin. The face is pinched and sharp; the pressure of the muscles of the cheeks exerts buccal pressure; the mouth is usually never closed firmly except when eating, but has an anxious, almost open appearance, although the lips might be closed. Apprehension is evident in the appearance of the eyes as well as the face.

You may ask, "what has all this to do with the relation of the dentist to the orthodontist?" The orthodontist cannot always detect this inner conflict in a young child as its effect is not quite complete, and its various complications during various age periods of life or periods of stress very often confuse our findings. In a young beautiful girl the lines in the face are not quite as well

marked even though she might come under the category of the nervous type, and, to complicate and confuse further, she might have a sharp, narrow face with beautiful eyes.

The general practitioner meets an older patient who shows the effect of his emotions, as they have been indelibly impressed. He meets the child's parents and, if he is, as he should be, a student of psychology, their facial appearance and behavior will give him a valuable clue. In many cases the child might have inherited certain characteristics, or his home environment might mitigate against mental serenity.

What can we do about it? When you see an unusual case you can suggest corrective measures to the parents. In an extreme case, the child can be psychoanalyzed, but in the average case the parents should see to it that Mary is taught to relax as much as possible, not to overplay, overwork, or is not given unpleasant tasks to do, to bring about a general serene state of mind.

The home life, of course, must conform to the proper pattern; otherwise the task will be difficult unless the child is one of those unusual children who do not hurry and get excited over every little thing. That type is indeed rare.

Adult Orthodontics.—It seems to me that adult orthodontics is somewhat in its infancy, as it has been difficult at times to get the orthodontist interested in certain phases of adult corrective procedures. Perhaps it is due to my lack of proper understanding of the difficulties involved, but there are a few men who seem to be able to carry a case satisfactorily to a most happy conclusion. Of course, we realize that the exodontist and the prosthodontist make a good team in some cases, but if the teeth can be brought into their proper relationship, or nearly so, the patient is usually better satisfied and truly grateful.

Periodontoclasia.—In many cases of periodontoclasia the orthodontist can be of great service, with the age of the patient not too much of a handicap. Frequently a consultation between orthodontist and dentist might solve a dental problem without orthodontic appliances. The extraction of one tooth in an older person frequently is all that is required.

Impactions.—At times one is perplexed over an impacted third molar. Should it be taken out or not? If the roots are in a rather dangerous position in relation to the inferior dental canal with little hope of a change, it might be advisable to remove the second molar and allow the third molar to come up, which it often will do. It could then be directed into the proper position by the orthodontist and made a very useful member of the arch.

In some cases if an impacted molar is extracted, the operation exposes the distal surface of the second molar to such an extent that that tooth can hardly be expected to remain in the dental arch very long.

Responsibility of the Orthodontist.—The responsibility of the orthodontist is great when treating the mouth of a child. The complications brought about by the attendance at school, sometimes in another city, frequent vacations, as well as the long summer period, plus frequent illnesses and periods of rampant decay in some mouths are very great and make otherwise simple cases difficult in the extreme.

Lack of cooperation by the parents, not only with the orthodontist but also with the general practitioner, causes many difficulties. Their too tolerant attitude at times with habits which might easily be corrected and also their intolerance with certain children with habits difficult to correct and control are at times discouraging.

Photographs.—I am sure that when it is necessary to take a photograph of a child before the work is begun and also during its progress, it would be appreciated by the parents as well as the dentist if extra prints were made and given to them.

Habits.—If a child has a thumb-sucking habit or any other habits which might be corrected and the orthodontist fails in his effort to correct them, it seems to me that the child's dentist should be advised of this difficulty and perhaps might be able to suggest a way to do it or work on the child himself. I have been able to correct cases of nail-biting and thumb-sucking when the physician or orthodontist has failed. At times we just happen to have the right psychological approach.

If a child tampers with appliances unduly, the dentist might be asked to cooperate and try to get the child to realize his responsibility.

Models.—When starting a case and after the first impression has been taken, it would be appreciated if a duplicate is made, securely packed in a wooden or metal box with the name, age, date, and any other pertinent information, and sent to the child's dentist. At stated intervals according to the case in hand, whenever another impression is taken, it might be advisable to forward a duplicate to the dentist, assuming that he is interested in your progress with the case.

Plan.—It would be of interest to the dentist to know at the start what the orthodontist intends to do, so that his course of treatment will not be misunderstood. At times certain teeth have to be moved laterally, before the main work of moving other teeth seemingly more important, at least from the patient's point of view. Some of this information is frequently given over the telephone and as promptly forgotten.

When the bands are removed and it is found difficult to get an appointment with the general practitioner, it would be a wise procedure for the orthodontist to take bite-wing x-rays. These should be mailed to the dentist and a notation put on the orthodontist's records to that effect.

Caries.—If obvious cavities or conditions warranting treatment are located, the orthodontist could make out an examination blank in triplicate with a notation of his findings. One copy should be mailed to the parent (not given to the child), one copy sent to the dentist, and the other kept on file. The child should also be told of the condition unless too young, and should be advised of the importance of the matter.

In many cases the parents assume that the orthodontist can see everything, but naturally he is reluctant to infringe upon the so-called prerogatives of the

general man. The orthodontist in many cases has his hands full in a busy practice and can hardly be expected to be an expert in cavity detection; many cavities become quite large before they are evident to the casual observer. In some cases a bit of cement at the contact point might obscure the initial stage of cavity formation.

Children are at times difficult to work on, and it is particularly unsatisfactory for the dentist to be forced to fill a great many cavities at one sitting, or perhaps at times two sittings, because Jimmie came in the last day of his vacation and must return immediately. Also, Jimmie would rather be at the movies and thinks it is all a lot of bunk anyway.

Suggestions.—A very good suggestion for orthodontists is the practice followed by some to send out cards or slips every six months to their parents, reading about as follows:

A REMINDER TO ORTHODONTIC PATIENTS

It is important to visit your dentist at least twice a year:

1. For removal of tartar forming under gums.
2. For minute examination of grooves and fissures.
3. For examination for cavities forming between the teeth which can often be detected only by an x-ray.

Patients under orthodontic treatment have the teeth which support the bands polished at each visit, but this does not take care of the dental examination and prophylaxis, which are essential at least every six months.

In some cases a brief examination blank is made out and sent to the dentist with a note on the back somewhat as follows:

Dear Doctor:

This examination is not presented as a complete survey of the teeth, nor as a diagnosis of any condition in the patient's mouth. It calls attention to possible need of treatment at the points indicated. Further examination may disclose other places which you will discover. I shall be glad to discuss these conditions with you if you so desire.

At your request, appliances which may interfere with your treatment will be removed at any time.

The patient has been advised to consult you. I would appreciate it if your secretary would call attention to this and arrange an appointment, should it be delayed or neglected.

Cordially yours,

In conclusion, it is evident to me that your horizons are clear, your approach deliberate, your goal the happiness and joy given to the many thousands of people who are now beautiful to look at, with radiant, clear, and sparkling eyes with the knowledge that Nature, through your guidance, has returned to them their natural heritage. Another pearl has been added to the rosary of scientific achievement.

44 WALL STREET.

SOME VIEWS OF THE AMERICAN BOARD OF ORTHODONTICS ON ORTHODONTIC EDUCATION

B. G. deVries, D.D.S.,* Minneapolis, Minn.

THE creation, development, and functioning of the American Board of Orthodontics over the past nineteen years is well known to all of you, and to dwell upon its origin and development would be merely repetitious. It might be well, however, to reiterate that its prime function has been to examine properly accredited applicants for certification and to accredit as specialists those who have successfully passed its examination.

The qualifications of an applicant which are essential before he may apply for examination are also well known to all of you and are clearly set forth by the Board. The actual examination material which an applicant is required to submit is determined within the Board itself, and this examination material is not at all identical in every instance. Likewise, the qualifications of each individual applicant are considered when the nature of his examination is to be determined. There are, however, certain fixed qualifications which every applicant must possess, one of them being "that the applicant must have been in the exclusive practice of the specialty for a period of not less than five years."

It may be of interest to you to know that at the present time the Board is composed of individuals having no affiliation whatsoever with any dental educational institutions. This rule has been maintained for a number of years, and the reason for it is, of course, obvious. This rule places the Board entirely outside of the realm of dental school influence, and none of the directorate can in any way be prejudiced in his consideration of an applicant's educational background.

As I stated before this same group last April, the American Board of Orthodontics has had an excellent opportunity to observe clinical procedure and fundamental thinking of a large cross section of orthodontic practitioners. The fact that it is in this position is doubtless the reason why it is now consistently being approached to take an active part in the development of orthodontic educational processes. I might even state that some may have considered the American Board of Orthodontics remiss in not taking a more positive attitude in the field of dental education and, more specifically, of orthodontic education. However, it is not a matter of unwillingness to cooperate in educational matters, but rather a consideration of the proper allocation of the responsibility for educational processes which has concerned the Board. The Board has maintained that such responsibility does not lie with a board which certifies the ability of the

*President of the American Board of Orthodontics.

Read at the Lincoln Meeting of the Central Section of the American Association of Orthodontists, Oct. 25, 1948.

operator in his practice, but rather it lies with the educational institutions themselves. Certainly, if dental schools enlarge the facilities for orthodontic education, the results of this action will be reflected in the quality of the work which is submitted to the Board for examination. But a judicial body such as the Board is supposed to be should never assume the responsibilities of other groups whose purpose it is to prepare applicants for examination. It would seem that the true effectiveness of a certifying board could be maintained at a more efficient level when such a board remained aloof from dental educational problems and refrained entirely from making any recommendations in connection therewith.

I can safely say that the Board has no arguments whatsoever with institutions which wish to prescribe a certain length of course where a special degree is conferred. This is their own prerogative, and the Board does not feel it necessary to inject itself into a discussion of the requirements with the various schools which offer advanced degrees. It is highly important that constant attention be paid toward raising our educational standards and facilities to encompass the constant advances which are being made in the profession. But the authority for extending educational horizons should come from the educational institutions, and while these processes are in progress, certainly no bars should be placed against men in anticipation of what may be or may not be a universal educational policy when full educational facilities are developed. At the present time, however, the Board does not feel that a prescribed course of graduate study of arbitrary length and content or the possession of a special degree must be a mandatory qualification before an applicant may apply for examination for certification. Such earned degrees naturally are taken into consideration in evaluating the qualifications of any applicant, and the time consumed in such study is accredited to the five years of practice requirement which is now being made. Perhaps it may be demonstrated within the next five to ten years that only men who have had formal graduate training will be able to perform clinical orthodontics creditably and perhaps by that time educational facilities will have become so expanded that they can accommodate the great numbers of men who wish to become specialists in orthodontics. The Board does not feel that that day has yet arrived. The American Board of Orthodontics feels that its qualification of five years in the exclusive practice of orthodontics is based upon a sound premise and, as I have stated previously, any time consumed in graduate work is considered in this qualification.

It must be borne in mind that the exacting qualification of five years of exclusive practice carries the connotation that the individual has assumed personal responsibility in his practice, and the Board feels that this is a very vital point. In evaluating qualification, we should also ask ourselves what about the man who has not had the opportunity for being admitted to graduate schools but has availed himself of every other opportunity for orthodontic development. Today, facilities for graduate study are so limited that in certain instances the admission of applicants has become a matter of the selectivity of a few only. Experience has shown to the Board that the clinical experience of such a man

throughout a period of five years can very amply prepare him for certification. Nor has it been the Board's experience that those who hold graduate degrees have invariably proved themselves more worthy of certification than others. In other words, the possession of an impressive number of degrees does not necessarily mean that the holder is a competent practicing orthodontist. If men with five years of actual clinical experience but not two years of formal education should take the examination for certification and are found to be poor practitioners, they have the right to be re-examined. If many of these instances occur, the applicant himself will seek graduate study. But to make such study mandatory centralizes the authority to establish qualifications in a fashion which may be hostile to the development of many fine specialists in an enlarging field of orthodontic service. The Board feels that we should preserve the right of an individual to apply for certification without having to wait or defer to the slow processes of establishing curricular changes and the provision of adequate educational facilities.

From the foregoing it becomes obvious that to be a truly effective examining mechanism, a certifying board cannot and should not assume any responsibilities in the dictation of educational policies. Only in this manner can it preserve a free mind. Nor does the Board believe it can be justly criticized for assuming such a position if it is fulfilling the functions for which it was established by the American Association of Orthodontists.

That the Board has been criticized because of its unwillingness to subscribe to the educational requirements as recommended by the Council of Dental Education of the American Dental Association is known to you all, and this is a source of regret to the Board. However, it has stated its position and it may be reiterated that it does not see eye to eye with those who believe standardized requirements can and should be made for all of the specialty boards in dentistry. The Board occupies the position of attempting faithfully to give the opportunity for examination for certification to the greatest number of men who aspire to proficiency in our specialty. To deny this large number this privilege because they fail to possess an educational requirement which at the present time can only be offered to a select few of the hundreds who are waiting in line, so to speak, does not seem to be a fair attitude on the part of the present American Board of Orthodontics. If, in the future, educational institutions erect higher standards which those seeking specialization must attain and at the same time provide commensurate increased facilities for the requirement of such education, the standards of practicing in our specialty may be greatly altered. As that time approaches, the American Board of Orthodontics unquestionably will find its qualifications for applicants changing materially, and it will indeed find it right and expedient to demand greater excellence on the part of those seeking certification by their own specialty board.

MEDICAL ARTS BUILDING.

SURGICAL CORRECTION OF DEFORMITIES OF THE MANDIBLE

DOUGLAS B. PARKER, D.D.S., M.D., NEW YORK, N. Y.

DEFORMITIES of the jaws naturally become facial deformities because the jaws are the skeletal framework on which the soft tissues of the face depend for much of their contour. Facial disproportion or asymmetry often affects the social and economic life of the individual and plays an important role in his character and welfare. These facts should make it incumbent on use to do everything possible to aid in the elimination or correction of those deformities of the jaws which contribute to facial deformities.

There are many etiological factors which may underlie mandibular deformities. Hereditary familial traits are often seen carried on from one generation to another. Congenital malformations may be the result of dietetic deficiencies in the pregnant mother. Position of the fetus in utero is another possible cause. Birth injuries during delivery may account for a very small percentage of deformities. Traumatic injuries from falls or blows on the chin are not infrequently the cause of arrested development of the mandible, especially in those cases that have resulted in ankylosis of the temporomandibular joint. Infections about the mandible which have resulted in osteomyelitis often cause an arrest of development of the mandible when the osteomyelitis occurs in childhood. Most of these deformities which result in a relative underdevelopment of the mandible we may classify under the heading micrognathia.

The overdevelopment of the mandible may be relative or real. The relative development is noticeable where there is an underdevelopment of the maxilla. We frequently see this in some of the cleft palate cases in which early operations which have interfered with the bone or periosteum have caused an arrest of development of the maxilla without interfering with the growth of the mandible. Vicious biting habits may result in malocclusions which tend to protrude the mandible. There are some systemic conditions which may influence bone growth, such as the activity of the pituitary gland. Acromegalia or Paget's disease may cause overstimulation of mandibular development which results in a distinct deformity.

In making a diagnosis of deformities of the mandible, all of the foregoing etiological factors should be evaluated. Casts should be made from impressions of the teeth so that the occlusion can be studied more accurately. Profile photographs should be made along with the full-face views.

Roentgenograms of the teeth and jaws should be made and in many cases a study of the temporomandibular area should be included. A profile roentgenogram of the entire head will often aid in making decisions as to the method to be

Read before the Northeastern Society of Orthodontists, Nov. 23, 1948.

employed in correction of the deformity, as this type of picture delineates the relation of the mandible to the maxilla.

In planning the treatment of mandibular deformities, many different factors must be considered: the presence or absence of teeth, the health of the teeth and the supportive alveolar bone, the occlusion of the teeth, and the relationship of bite planes; the size and length of the body of the mandible and the angulation of the body and the ramus of the bone; the age of the patient, as well as the cooperation of the patient. In deciding to undergo correction of mandibular deformities, we have to evaluate the part that each may play in the process. Teamwork is quite essential in the whole scheme of correction. The internist, pediatrician, general dentist, orthodontist, prosthodontist, and, last, the maxillofacial surgeon all can play a role in the team. The orthodontist can accomplish much in the early correction of these deformities by the use of corrective appliances and intermaxillary elastic traction. There are many of the exaggerated cases in which surgery and prosthodontia have to augment the orthodontic treatment.

The use of surgery in the correction of the prognathous mandible dates back to 1848 when Hallihen in his paper, "A Case of Elongation of the Under Jaw," reported a partial osteoplastic resection of the mandible.

In 1898 Blair performed an operation for the correction of this deformity as suggested by Angle. Since that time there have been many different operations reported in medical and dental literature, using a variety of surgical techniques to correct prognathism. The two principal methods are osteotomy performed in a variety of locations and ostectomy of the body of the mandible.

The first essential to any of the techniques of surgical intervention is the taking of accurate impressions of the upper and lower teeth and making plaster models which might be set up on an articulator for the more intimate study of the occlusion of the teeth. By shifting the mandible posteriorly on the articulator, it can be readily determined whether the maxilla and the mandible can be articulated into a more normal practical occlusal relationship. This can be accurately measured so that a determination can be made of the extent that the mandible has to be shifted posteriorly. It can also be determined whether there is interference with occlusion by the malrelationship of the planes of the cusps of the posterior teeth. This can be corrected before operation by the judicial grinding of the cusps of the molar or premolar teeth, as the necessity indicates, on the plaster casts. This preoperative procedure often facilitates a better position in occlusion and is more comfortable to the patient during the immobilization of the mandible.

From the preliminary casts which are taken, we can plan and determine the type of splints or arches which would be most desirable in the individual case at hand. The splinting of the mandible is essential in any of the surgical techniques to correct the prognathous mandible. Anchorage for any type of splinting must be distributed on as many teeth as possible because the strong muscle pull of the depressor muscles of the mandible and the strong upward pull of the masseter and temporal muscles tend to create an open-bite. If the anchorage is confined to a few teeth, these may be practically evulsed during

the long splinting period. Where orthodontic cooperation is available, the banding of individual teeth and the use of labial arches distribute the stress evenly over all of the teeth. Cast metal or plastic splints are sometimes used, but these present many difficult problems of alignment and cementation to the teeth. Unless the adaptation of the splint is good and the teeth thoroughly dry when the splint is cemented in place, the splint is likely to become loosened and present the problem of being recemented in place. The problem of removing a metal splint where the cement has held well is another disadvantage of the cast metal splint.

The problem of repositioning the mandible to present a more normal occlusal and esthetic relationship is a surgical one. There are two schools of thought regarding the accomplishments of this problem. One is by the various methods of osteotomy and the other is by the procedure of ostectomy. Each technique has certain advantages and disadvantages, and good results may be obtained by either one.

The operation of osteotomy for correction of the prognathous mandible is one in which the ramus of the mandible is severed on each side and the mandible carried back and immobilized in the desired relationship with the maxilla. This principle was first advocated by Blair and has been the most popular procedure used by many surgeons because of its simplicity. Most surgeons cut the ramus in a horizontal plane just above the point of entrance of the mandibular branch of the fifth cranial nerve into the bone.

The osteotomy as advocated by Blair is performed entirely outside of the oral cavity and presents very little possibility of contamination. A curved Blair pedicle instrument is introduced through the skin at the posterior border of the ramus of the mandible at a point above the entrance of the mandibular nerve. The needle is passed through the soft tissues to the inner side of the ramus and, hugging the inner side of the bone and passing under the mandibular nerve and vessels, it is brought out through the cheek just anterior to the ramus. A Gigli saw is attached to the large eye of the needle and the needle is then pulled back through its original passage, carrying the Gigli saw with it. This flexible saw is then manipulated back and forth by means of handles attached, until the ramus is cut through on a horizontal plane. This is followed through on the opposite side with the same technique, and the mandible is freed from its joint attachments and is movable. The mandible is then pushed back into the position desired and immobilized by means of the splints or arches previously placed in position on the teeth.

The advantages of the foregoing operation are its simplicity, minimum scarring of the soft tissue, and avoiding injury to the facial or mandibular branch of the facial nerve, if carried out by a surgeon trained in this technique. This operation can be carried out under local anesthesia so that it would be safe to immobilize the jaws immediately on completion of the operation.

The disadvantages of this operation are: it is a somewhat blind procedure that cannot visualize the structures cut through and it may be difficult to control hemorrhage where vessels may be cut; it is difficult to keep the two cut surfaces of the ramus in apposition so that good union of the bone is secured; not infre-

quently the temporal and pterygoid muscles will pull the upper fragment inward so that there is no union and the action of the masseter muscle pulls the distal fragment upward, foreshortening the vertical dimension of the ramus, where molar teeth are in position they act as the fulcrum of a lever of the first class, and an open-bite of the anterior teeth is the result—a deformity as bad or worse than the original condition.

Some surgeons do the operation of horizontal osteotomy through an open incision so that the severing of the bone can be done under direct vision and the ends united by wiring through holes drilled in the ends of the bone. This has the advantage of being more certain of union when the cut ends of the bone are held in close apposition. There are two methods of approach in the direct vision osteotomy. One method is making an incision posterior to the ramus and below the lobe of the ear and then splitting the masseter muscle and elevating the parotid gland. In this method there is some danger of injuring the facial nerve. The other direct approach method is that advocated by Risdon which employs an incision at the angle of the mandible, stripping off the attachment of the masseter muscle and exposing the external surface of the ramus; by retracting the muscle and the parotid gland, an exposure of the operative site can be obtained. This technique lessens the liability to injury to the facial nerve. Dr. Moose of California employs a technique of intraoral approach to saw through the ramus. This increases the liability to infection because of the contamination with the mouth. The possibility of infection can be greatly reduced under present conditions by the prophylactic use of antibiotic agents which are now available.

The operation of ostectomy for the correction of prognathism has been employed by some maxillofacial surgeons, but more often by the general or plastic surgeon who may attempt such a procedure. This operation implies the removal of a section of the body of the mandible on each side equal to the distance that the symphysis needs to be carried back. This can, of course, be predetermined by sawing through the models and removing a section so that the teeth will occlude in the proper relationship. The operation is performed by first removing a molar or premolar tooth on each side as a preliminary step and then by removing a section of the body of the mandible on each side by an extraoral approach through the lower border of the mandible. This operation when carried out in the usual manner cuts the mandibular nerve on each side and leaves complete anesthesia on both sides of the chin and lip. Usually there will be regeneration of the nerve within a six-month period. The danger of infection by contamination with the mouth is also a factor to be considered in this operation. A more recent modification of ostectomy has been reported in the literature by Dr. Dingman of Michigan, who has successfully reported a two-stage operation in which the mandibular nerve is not severed during the ostectomy, but is looped on itself and replaced in the bone. In the first stage of this operation the first molar teeth on each side are extracted under local anesthesia, the gums are retracted, and then two cuts are made vertically through the buccal and lingual alveolar bone corresponding to the portion of the body of the mandible to be removed. These cuts are made down to the level of the mandibular nerve; some

of the superior portion of the alveolar bone is removed, and the gum is sutured together over the alveolar ridge. This is allowed to heal and usually four weeks intervene before the second stage of the operation is carried out. In this stage the approach is through an incision under the lower border of the jaw, and the soft tissue is retracted to expose the vertical cuts made in the first stage. The bone is cut through from below up to these cuts, and the external plate of bone is removed to expose the mandibular nerve. The bone is then removed on the lingual side without cutting the nerve, and when the entire section has been removed a little hollow section of bone is scooped out alongside the nerve so that the nerve can be looped into this without being compressed when the cut ends of the body of the mandible are placed in coaptation. The mandible is then immobilized by the previously prepared splints. The coapted ends of the bone can be wired also by direct fixation through holes drilled in the ends of the bone. In this technique the nerve is not destroyed, but there may be slight anesthesia for a few days due to the congestion about the nerve from the operative handling.

The immobilization of the mandible in both osteotomy and ostectomy should be maintained for at least eight weeks as a rule. Sometimes, in cases in which the vertical dimension of the ramus is likely to be shortened by poor bony contact or overlapping of the cut ends in osteotomy of the ramus, it is of advantage to open the bite of the posterior teeth a few millimeters by a bite block. This is especially true when posterior teeth, which normally might be used as a fulcrum, are missing.

Micrognathia in which the mandible is underdeveloped and the typical receding chin is present presents a major deformity. While orthodontic treatment can accomplish a great deal in realigning the teeth and improving the bite, it will not materially change the inclination of the underdeveloped chin or the length of the body of the mandible. The procedure here is a cosmetic one after all that can be accomplished by orthodontic treatment is completed. There are two ways to improve the appearance of such a patient. The simplest way is to restore the fullness and contour of the chin by means of a graft or an implant, either autogenous bone or cartilage being the best and safest. The iliac crest is the best source for obtaining bone, and the costal cartilage from the ribs is the best source of cartilage. However, in cases in which it is not advisable or expedient to use the patient's own tissue, we can resort to preserved cartilage or bone taken from another individual. Such material is often transient and will undergo absorption, but in the meantime it may act as a matrix for some new tissue growth. We are always safer to use the patient's own tissue in any graft or implantation because it will become fixed and incorporated into the site of implantation. There have been many different foreign body tissues used to build out contour in connection with the loss or lack of development of bone. Vitallium and tantalum have been used both for skull and jaw defects.

Another material that is well tolerated in the tissues is polyethylene. This can be molded or cut to fit the defect and then the surface roughened and penetrated by numerous holes drilled through the material. This is done to allow connective tissue to grow through the holes and it does not interfere so much

with local circulation. In one of the large plastic clinics in the East, they have employed implants of polyethylene to build out the contour of the chin. The time elapsed since these implants have been in place is not long enough to draw any definite conclusions. From early evaluation of these cases it is seen that polyethylene has not created any tissue irritation or untoward reactions, and it is hoped that it will find a useful place in the field of reconstructive surgery.

Another method of treating these cases of micrognathia is the reverse procedure of that employed in prognathism—the use of horizontal osteotomy through the ramus. Instead of replacing the mandible posteriorly, it is replaced anteriorly. This presents a much more difficult problem, as there is quite a muscle and connective tissue pull to overcome. In some cases surgeons have attempted the operation of elongating the body of the mandible. For this procedure the soft tissue overlying the body of the bone and alveolar process has to be stretched by constant traction, which does not permit of much elongation. Another objection to this method is that even if you do elongate the body of the mandible, the posterior angular inclination of the symphysis stays the same but is moved farther forward, and it is generally necessary to build out the point of the chin anyway.

There is an occasional case in which the teeth are in a good occlusal relationship but the point of the mandible is particularly prominent, even though the lip contour in the profile is normal. In such cases it may be necessary to excise the prominence of the point of the mandible through an external incision under the chin.

In conclusion we might say that deformities of the mandible and maxilla may change the whole social and economic life of the individual, as well as the psychic outlook. The correction of these deformities often accomplishes a marked rehabilitation of the individual. The technique of correction is often the cooperative teamwork of the orthodontist, prosthodontist, and maxillofacial surgeon. Practically all of these deformities can be corrected in a cooperative patient who is anxious to improve his condition. Ofttimes the help of a psychiatrist has to be elicited to complete the chain of rehabilitation. It is a great satisfaction to all concerned to change the character and social outlook of such a patient. This is especially true in the female patient, who depends so much on her facial appearance in her contact with the world.

121 East 60th Street.

THE ANGLE SCHOOL OF ORTHODONTIA*

BERNHARD W. WEINBERGER, D.D.S., NEW YORK, N. Y.

WITH the rapid development of orthodontics, the *Angle School,* except for the older men, has now become almost a tradition. Little of its importance, its influence, and the part it played in the early days in creating the specialty of orthodontics is recorded or remembered. Although the first actual session of the school dates from 1900, what took place in November of 1899 marks the actual beginning of this phase of orthodontic history and has so been recorded in the minutes of the *American Association of Orthodontists.*[1]

As the year 1949 marks the fiftieth anniversary, it would seem fitting at this time to record such information as we have of its origin, its success as a teaching institution, and the part its graduates played in bringing about the specialization of orthodontics.

How often I have wished that in the past someone would have taken the time to record during his lifetime such facts familiar to him as to the origin and events that brought about our societies. The task of the historian would then have been simplified. It is this motive that prompts me now to write the story of the *Angle School of Orthodontia.*

While I did not take the course until 1909, in my freshman year at the *Colorado College of Dental Surgery,* 1905, it was my good fortune to have as fellow students the brother of Herbert A. Pullen, Ralph, and Edward Canning, the brother-in-law of Edward H. Angle. They, with Dr. A. H. Ketcham and Dr. Fred McKay, often discussed the early days of what took place in St. Louis, and I now regret that I failed to record at the time much of their conversations. It was their enthusiasm, their keen interest in the subject, and their guidance and help throughout my undergraduate years that prepared me for the course I was later to take. To them and to Dr. Angle I owe my inspiration for my historical writings.

In addition, I fortunately have succeeded in obtaining about the only complete files and have had bound those of the announcements of the *Angle School of Orthodontia* (missing 1903), the programs of the *American Society of Orthodontists* (missing only 1905), the complete files of the *Alumni Society* and the *Eastern Association of Graduates of the Angle School of Orthodontia.* The preservation of these valuable records is of inestimable aid in historical research.

*The use of the words "orthondontia" and "orthodontics" will confuse the reader, for it was not until around the twenties that the latter word came into general use; previously "orthodontia" was used, so I have therefore retained it when quoting.

THE ORTHODONTIC SITUATION AT THE END OF THE NINETEENTH CENTURY

To understand better and appreciate more fully the lifework of Dr. Angle, his difficulties, his reaction to the ideas of his own contemporaries, and his efforts with his own students, it might be advisable at this time to record the situation in orthodontics and dentistry prior to the establishment of the Angle School. It will therefore be necessary to go back to that memorable session at the Ninth International Medical Congress held at Washington in September of 1887. Among those present were many who later were to play an important part in orthodontics, such as Ainsworth, Bogue, Case, Farrar, Guilford, Jackson, Kingsley, and McGill.

It was at that time that Dr. Angle introduced to the dental profession the *Angle system,* and the paper as published was the first edition of his series of *Malocclusion of the Teeth.* Instead of the favorable comment Dr. Angle received in Minneapolis, the discussion as reported centered mainly upon the question of priority of discovery and not concerning the value of his proposed treatment and methods or a consideration regarding the movement of teeth. In this paper I cannot give the details of what then transpired. Those interested will find the full story in another article.[2]

Few of the younger orthodontists have the slightest idea of the bitterness of the conflict that began in Washington. I have had the opportunity to read some of the correspondence between some of the men, and it is difficult to understand why and how they allowed their personalities to cloud their minds to the extent that they did. Not one in our profession has had to contend with a similar situation and, fortunately, we have escaped the turmoil of such an environment.

There have been differences of opinion, controversies have been waged, but never were they struggles of embitterment or such personal hatred. It would have been impossible at that time for orthodontic societies to have been formed and remain in existence throughout the years they have nor could they today if we had to contend with such difficulties as then prevailed. The following incident will best illustrate just what I mean. At the time Dr. Case was on his deathbed, one of the outstanding orthodontists decided to send flowers and best wishes for a speedy recovery and therefore wired a friend in Chicago to do this for him. At the time they were received Dr. Case was conscious for a brief time and admired the flowers, but upon learning who sent them, he ordered that they be returned and then lapsed into unconsciousness, thus carrying his hatred and bitterness to the very grave.

With this background of hate, antagonism, abuse, and opposition one wonders how Dr. Angle was ever able to start the school and gather together a group of men of whom Hellman once wrote: "No more outstanding personalities graced the list of members of any professional group than did those of the Angle School."[3]

DR. ANGLE'S EARLY TEACHING EXPERIENCE

Dr. Angle's interest in the subject of orthodontics dates almost from the time he entered the practice of dentistry. For thirteen years preceding the

establishment of the school he held the chair of orthodontics first at the *University of Minnesota,* 1885 to 1892, then at *Northwestern University,* 1892 to 1898, teaching the subject also at the *Marion Simms College of Medicine,* 1896 to 1898 and at *Washington University,* St. Louis, 1897 to 1899. His experience soon convinced him that although dentistry and orthodontics both dealt with the human denture, they were, however, fundamentally distinctively different sciences. The teaching of the subject at the best was in such a fragmentary and superficial manner that he felt that none of his pupils ever graduated with sufficient knowledge to undertake an orthodontic case properly.

By 1899 he stated[4]: "I became filled with the belief that if orthodontia was to make any material progress, a separate school, entirely independent of dental schools must be formed, which would amply provide opportunity for those with aptitude and liking for the subject to study in a broad, thorough and comprehensive manner. . . ."

"Having tried to impress the management of the dental departments of *Northwestern University* and the *University of Pennsylvania* with the desirability of their forming special departments devoted exclusively to the study and practice of orthodontia" and proposing that "orthodontia in these institutions should be optional, those having an aptitude and liking for the work, giving after the second year, their entire time to its study and practice, the answer was always the same 'This is too Utopian' or 'It is too early.' "

PRIVATE INSTRUCTION IN 1899

Dr. Angle was by that time certain that he would never succeed in convincing the presidents and faculties of dental colleges to view the teaching of orthodontics as he saw it; therefore, when Henry E. Lindas, Thomas B. Mercer, Herbert A. Pullen, and Milton T. Watson approached him during the Niagara Falls meeting of the National Dental Association in August of 1899 and requested that he instruct them privately, he gave the matter serious consideration. These men had become interested in Angle and his idea of orthodontics, and in November they assembled in his office in St. Louis for a brief three weeks of intensive study to master the problems and technique of orthodontics. Convinced that Dr. Angle had much to offer, they suggested that instead of private instruction it would be far more advisable that a permanent school be established whose chief aim should be the advancement of orthodontics.

ANGLE SCHOOL OF ORTHODONTIA

The experiment with Lindas, Mercer, Pullen, and Watson as private students convinced Dr. Angle that the time had arrived to undertake such a school, and, with the assurance that they would return the following summer to repeat the course and to aid him in instructing the others, he began to give serious thought to such an undertaking. In the February, 1900, issue of the dental journals a notice appeared that a postgraduate school in orthodontics had become a reality and that applications for admission were being accepted.

That the time was ripe for such an institution was shown by the fact that "there were at once more applications for admission to the special teachings of this school than could have been accepted even if all had proved acceptable. . . . It has always been Dr. Angle's belief that those of proper moral, mental, and physical fitness, with special aptitude and liking for the work, should be encouraged to study orthodontia, hence the school has always stood for quality in its students." The requirements for admission laid down by Dr. Angle and enforced during the various sessions of the school were:

> First, you must have honesty and integrity.
>
> Second, you must have had at least a high school education before graduating from a truly reputable dental college.
>
> Third, you must not have been in general practice of dentistry longer than seven years. Experience has taught us that men become "dentalized" so to speak, or so narrowed by the little things in dentistry as to seriously handicap them in the broad and profound study and practice of orthodontia. . . .
>
> Fourth, you must be studiously inclined and have an aptitude and liking for orthodontia; must have a mind beyond the grasping of mere mechanics, and must be willing to make orthodontia your life's work. . . .
>
> They must furnish letters from at least three well known and reliable members of their profession, as to their ethical standing, their education. . . . Under no circumstances will anyone be received unless he can furnish such credentials.
>
> We would impress applicants with these final words: That credentials are essential—not a mere form but that they are entirely useless unless coming from well known men of undoubted integrity in such matters. The ordinary letter of recommendation given in this country has degenerated into a mere farce. Such letters will not be accepted.

Not until the last class in 1911 did Dr. Angle accept the limit, twenty, as set down by him. The class of 1900 had eleven students, 1902 graduated ten; 1903, fifteen; 1904, twelve; 1905, eighteen; 1906, ten; 1907, eighteen; 1908, twelve; 1909, fourteen; 1911, twenty-three. Beginning with the class of 1907, in addition to the previously mentioned requirements, a special preliminary examination was held that weeded out a number of applicants before the class got under way. This examination was no joke and required a knowledge of Noyes's *Dental Histology,* Chapter II in Kirk's *American Text-book of Operative Dentistry,* the anatomy of the throat, nose, and jaws after Gerrish, and tooth form from Black's *Dental Anatomy.* In other words, the student had to have a comprehensive knowledge of biology, embryology, histology, anatomy of the head and neck, and of dental anatomy.

In most of the classes a few were found wanting and failed to graduate or to receive the certificate, for examinations were "held at the close of the session and those successful in making a general average of 80%" received such certificate. "Only the names of graduates in good standing will appear in the annual announcements."

The First Session.—Those who took the first course in 1900 were the following eleven men: Charles B. Blackmar, Jackson, Michigan; Frank A. Gough, North East, Pennsylvania; Fred C. Kemple, Erie, Pennsylvania; Henry E. Lindas, Great Bend, Kansas; Lloyd S. Lourie, Chicago, Illinois; Thomas B. Mercer, Minneapolis, Minnesota; Grafton Munroe, Springfield, Illinois; Herbert

A. Pullen, Green Bay, Wisconsin; F. W. Rafter, Gardiner, Maine; Richard Summa, St. Louis, Missouri; Milton T. Watson, Bay City, Michigan.

In the printed announcement of the second session in 1902 we find the following interesting information.

"The success attending the work of the first session of this school surpassed the fondest hopes of all concerned. The class was composed of men of mature minds, who came with a definite purpose, and worked earnestly to that end; and it is doubtful if there has ever before been assembled a more active, sincere and appreciative class in the study of any branch of science, or one that made more progress than this class."

This time the course of instruction covered a period of five weeks, which was gradually increased to eight in 1908 and nine in 1909 and 1911. The tuition for the first six courses was $150 in 1907, it was raised to $175, and in 1909 to $225. Those who desired to retake the course at any time could do so without additional tuition.

Course of Instruction.—The course of instruction consisted first "in an exhaustive study of the normal in the human denture, that is, of its anatomy, biology, histology and embryology, the effort being to establish in the mind of the student a true concept of the line of occlusion—the line of balance and of the forces—the foundation on which all orthodontic treatment is or should be based. Knowledge of the line of occlusion of course includes thorough knowledge of all parts, structures and tissues directly or indirectly related to the teeth, and of the mechanical forces—the forces from functioning—that are so vitally concerned in the growth and development of the dentures, the human 'mill.' In addition to lectures and recitations this study is conducted by means of skulls and models in which the occlusion of the teeth is normal, the skulls being both human and of lower animals.

"Having made a thorough study of the normal the foundation has been laid for an understanding of the abnormal in occlusion, in the forms and sizes of dental arches and jaws, in the lines of the face, in all the various muscles and other structures that are modified through perversion of the forces of function and growth of the denture. This is next taken up, together with careful consideration of all the known causes of malocclusion.

"Classification and diagnosis naturally follow. No phase of orthodontia being of greater importance or more essential for the student to master, these subjects are dealt with accordingly.

"With regard to mechanism for treatment there is rife in orthodontia today a condition closely bordering on chaos. This is unquestionably due to the general lack of scientific understanding of the laws by which the use of orthodontic mechanism should be governed—the laws of anatomy, physiology and the natural mechanics of the denture—and of the principles upon which such mechanism must be constructed and operated if the mechanism is to conform to these laws. In order, therefore, that the student may become familiar with these laws and principles and thus be able to distinguish between correct and incorrect, practicable and impracticable, efficient and in-

efficient mechanisms, between mechanisms that conform to the essential principles and those that do not, the history of orthodontic mechanisms is quite thoroughly studied and the principles upon which those of the past, as well as those of the present, are constructed and operated are weighed, analyzed and compared by each student.

"Much time and thought are also given to all phases of the technique of fitting, adjusting and operating what we believe to be mechanism for orthodontic treatment that most completely embraces these principles and conforms to these laws. All of this teaching is under the direct supervision of Dr. Angle.

"Not until the student is well advanced in the work above outlined and has acquired a high degree of skill in performing all of the required technical operations is any attention whatsoever given to the consideration of treatment of actual cases. But these having been accomplished, methods of treatment, particular tooth movements, relations of tissues and structures, force control, retention, etc., are carefully and fully considered and treatment of practical cases in the clinic begun.

"Special emphasis is laid on the widely differing requirements of the two separate and distinct periods of treatment, or, first, active treatment, and second, passive treatment or retention. Also, on the fact that a few weeks, or months at most, is all the time necessary for any one period of active treatment which, if correctly performed, need be followed by a correspondingly short period of retention only.

"All students are themselves required to treat cases and to closely observe and discuss those treated by the others of their class, all under the close supervision of Dr. Angle and his carefully trained assistants."

Quizzes and Technical Instruction.—Systematic quizzes, supplemented by the use of the lantern and plaster models, were given each day on all lectures of the preceding day, while clinical and technical instruction was in charge of associates of Dr. Angle. This included the cultivation of skill in soldering, assembling appliances, impression taking, and model making. Much stress was laid upon model making, as the importance of carefully trimmed models was constantly emphasized. In the clinic all took part in the discussion of treatment of patients.

We thus learn of the broad scope, the requirements, and the general plan of how the Angle School was conducted.

The Faculty.—"At the school there was shortly assembled a faculty—remarkable for its earnestness, its unselfishness, its vision and its singleness of purpose to make orthodontics a profession worthy the life efforts of the best minds." That the school was a success was largely due to the men Angle assembled around him.

Five men made up the faculty of the 1902 session. Dr. Angle assisted by Alton H. Thompson as lecturer on comparative anatomy of the teeth; Thomas Rumbold on rhinology, with Milton T. Watson as technical and clinical instructor, and Lloyd S. Lourie as assistant. Beginning with 1904 Richard

Summa assumed the secretaryship, and became clinical instructor. Greenfield Sluder took over rhinology, Frederick B. Noyes taught histology and anatomy, Edmund H. Wuerpel, art with Martin Dewey as clinical instructor; A. H. Thompson continued his lectures on comparative anatomy.

The following year Dr. Sluder was replaced by Dr. W. E. Sauer. Fred S. McKay, acting as superintendent, gave the clinical and didactic instruction and with the others mentioned constituted the faculty.

In 1906 in addition to the former members, Martin Dewey returned this time as lecturer on anatomy, and laboratory and clinical instructor. All returned in 1907 and in addition a course in photography was added, Mr. J. C. Strauss being the special lecturer.

In 1908 the school was moved to New York City and several changes occurred in the faculty. Dr. Frederick L. Stanton became the secretary, superintendent, and was assistant instructor in rhinology. Martin Dewey, being the lecturer on anatomy, also acted as assistant instructor in histology and comparative anatomy and instructor in clinic and technique. Frederick B. Noyes continued to teach embryology and histology and Mr. Edmund H. Wuerpel art. The new men were Raymond C. Osborn on comparative anatomy, Antoine P. Voislawsky, rhinology, A. H. Ketcham, special lecturer and demonstrator in photography and the x-ray, with Mr. E. B. Core on photography.

The 1909 session was held in the Munsey Building, now the Hotel Mohican at New London, Connecticut. In addition to the faculty members of the previous session, Rolof B. Stanley became instructor in clinic and technique, Josef Grünberg, demonstrator in technique, Frank B. Gough, impression taking, Milo Hellman, model making, with Alfred M. Desnoes in soldering technique.

The final session, 1911, was held in the Harbour School, New London, and we find a considerable revamping of the faculty. Dr. A. W. Crosby acted as secretary while Josef Grünberg took over as superintendent. Dr. Noyes, Dr. Osborn, Dr. Voislawsky, Dr. Wuerpel, and Dr. Core continued to teach their subjects. Albin Oppenheim lectured on anatomy and was assistant instructor in rhinology and in applied orthodontics. George M. McKee, photography x-ray; Milo Hellman, quiz-master; while Frank A. Gough, R. B. Stanley, A. W. Crosby, and Guilhermena Mendell gave the orthodontic lectures.

While Dr. Angle had the final word on the choice of the students, it fell to the lot of the various secretaries to sift the numerous applications and qualifications. It is indeed a remarkable fact that they selected such a high percentage of men, 123 out of the 143 graduates, who later became outstanding figures in orthodontics and held repeatedly high offices in dental and correlated sciences, taught in various colleges throughout the world, and served in hospitals and in various institutions.

It was these men who helped to create the specialty of orthodontics and established the fact that it was a specialty of dentistry. Through the efforts

of the school, orthodontics the specialty soon took high rank in the professional world. It is a source of much gratification that all of the early orthodontic societies, both local and national, in this and other countries owe their origin to the students and the influence of this school. The American Society, now the American Association of Orthodontists, was organized as a direct result of the founding of the school, and all of its charter members, with but two exceptions, and as late as 1906 all of the graduates of the school were members. Its Alumni Society was formally organized on Dec. 2, 1905, and continued until 1914.

The Eastern Association of Graduates of the Angle School of Orthodontia held its first meeting on Jan. 18, 1907, but did not become a permanent organization until June 11, 1909. It continued as an active and important link in orthodontic progress up to May 9, 1939, and although it discontinued holding scientific programs it still remains in existence, having dinner sessions now and then. Among other societies organized as the direct result of the school were the British Society for the Study of Orthodontia, 1907, Edward H. Angle Club of Colorado, 1907, Central Association of the Angle School, 1913, and the Pacific Coast Society of Graduates of the Angle School of Orthodontia, 1913. Through these groups there have now developed some of the sectional societies of the American Association.

Much of the teaching that the early graduates received in the school in turn has been imparted orally to many students with whom they have come in contact or had as assistants; thus the influence of the Angle School is still active, and its traditions still guide others to build further our profession.

Dr. Angle, having felt that by 1914 he had "proven a place for orthodontia, established the fact that it *was* a specialty with boundary lines as definitely defined as those of any other specialty in medicine and demonstrated that its healthy growth depended on its being ably taught and scientifically practiced *as a specialty,*" discontinued the school in order to retire, feeling that the time had arrived when such teachings "would promptly be taken over by great universities which would create departments with adequate facilities and special faculties for its proper teaching, departments which would be entirely separate and distinct from the dental departments." I will return to this phase later.

Therefore, to Dr. Angle orthodontics owes the renewed impetus he instilled in a new science. No one man in dentistry did more to foster this branch, causing its separation from the general practice, bringing about its specialization, and advancing it to a recognized profession. To him we are indebted for seeing the wisdom of establishing the first school. With his help and the support of his first graduates, the first orthodontic society naturally followed, and then in 1907 they published the first orthodontic journal, the *American Orthodontist.* Without a school, a society, and a journal of its own, no definite progress in science has ever been made. This is the heritage of the Angle School.

The Alumni Society.—It was in 1905 that the question of fee splitting arose in the *American Society of Orthodontists.*[5] Those who felt the practice to be wrong and failed to convince all of the members that if it was to become a common practice the standards in the young specialty would be lowered, broke away and founded the Alumni Society. A few of the graduates as well as some of the members, while they agreed with the idea, refused to leave the mother society, and thus brought about a definite split. Thereafter each graduate had to agree to join only the Alumni Society and not affiliate with the older organization. It is for that reason that the names of the later graduates do not appear on the membership roll of the American Society until after 1914.

Between 1905 and 1913 everything remained harmonious. Those who attended the meeting in 1913 realized that a storm was in the making, but few even today know just what brought about the sudden demand for a change in the constitution so that only those in good graces would receive a personal invitation from the regent to attend its future meetings and that "meetings of the Society shall hereafter be considered as postgraduate course of study." Many of the *selected group* refused to go along with the *new deal* setup which they definitely did not like, and thus the society came to an abrupt end.

In a letter dated March 23, 1914, and sent to the members of the Alumni Society, the fourth amendment offered for consideration becomes important. It is the one I quoted previously, pertaining to the society becoming the teaching institution.

Dr. Angle had by that time decided to discontinue the school because of ill health, and his wish was to be relieved from the responsibilities of teaching and conducting the school. The intrigue of one individual who desired to take over the school brought about disharmony among the former faculty, as well as in the society, and with the discontinuing of the society it was only natural that the school went out of existence at the same time, to be replaced by a postgraduate course of study.

Its discontinuation was a great disappointment. The following year, 1915, saw an attempt by some of Dr. Angle's students to have the *University of Pennsylvania* take over the school. At one time negotiation had reached the point when the committee felt all obstacles had been surmounted, but it finally ended in failure because Dr. Angle "insisted that a certain former student of his must head the clinic," the same one who brought about the end of the society and the school. The university, according to Dr. Kirk "could not be dictated about appointments."[6] Had Dr. Angle then cooperated, it is certain that the chaos that began to take place would not have occurred.

Meanwhile, Dr. Angle moved to California, and there one day in 1917 a young student, James C. Angle, appealed to him as did the four in 1899 to accept him for private instruction. Again he acquiesced and shortly thereafter began his second venture, *The Angle College of Orthodontia.* This I must leave for others to narrate. Because occasionally one hears that "so and so" had been a private pupil of Dr. Angle, I asked him in 1924 if such

was the case, to which he replied that with the exception of the four men in 1899 and James C. Angle, at no time did he teach others except in the school, the list of graduates I here record.

GRADUATES

Abell, Burt	1903	Kemple, Frederick C.	1900
Anema, Rene	1904	Ketcham, Albert H.	1902
Baker, Lawrence W.	1911	Kihita, Mataich	1908
Bethel, Louis P.	1904	Krejci, Lawrence A.	1907
Blackmar, Charles B.	1900	Lane, J. G.	1911
Bolkes, H. G.	1911	Law, William G.	1903
Bolton, W. H.	1905	Lewis, S. J.	1911
Bowman, Glenn F.	1907	Lindas, Henry E.	1900
Bunker, Jane G.	1904	Lockett, A. C.	1905
Burrill, J. A.	1905	Loeffler, H. E.	1909
Butler, E. Santley	1911	Lourie, Lloyd S.	1900
Cameron, Samuel P.	1906	McArthur, Nelson	1911
Cantaluppi, Georgette J.	1906	McCoy, James D.	1905
Casto, Frank M.	1902	McCoy, John R.	1911
Cavanagh, William	1908	McDonald, F. W.	1911
Chambers, R. Carter	1905	McKay, F. S.	1903
Chapman, Harold	1905	Mann, C. C.	1909
Clapp, H. M.	1906	Mendell, Guilhermena P.	1902
Collins, S. J.	1903	Mercer, Thomas B.	1900
Corrigan, C. A.	1907	Mershon, John V.	1908
Crosby, Albert W.	1905	Milam, T. M.	1903
Danforth, A. G.	1903	Mills, John	1907
Day, Roscoe A.	1907	Minez, J.	1911
DeLong, George A.	1905	Mitchell, E. L.	1909
Desnoes, Alfred M.	1908	Monroe, A. F.	1905
Dewey, Martin	1902	Morehouse, H. L.	1907
Diaz, Pedro A.	1906	Morris, Watkin W.	1904
Dodson, Silas E.	1903	Morse, Wellslake D.	1907
Dunn, Robert	1902	Mount, James J.	1904
Edmonds, Dana J.	1904	Moxham, Cecil George	1908
Ellis, Walter H.	1904	Munroe, Grafton	1900
Engstrom, C. O.	1911	Murlless, Frederic T., Jr.	1906
Federspiel, M. N.	1902	Newcomb, Walter E.	1907
Ferris, H. Clay	1906	Noyes, Frederick B.	1908
Fletcher, G. A.	1909	Oidtmann, Joseph	1907
Flint, Willard D.	1902	Oppenheim, Albin	1911
Foster, Wilson	1903	Palmer, George B.	1906
Friel, E. S.	1909	Parshall, Homer E.	1905
Fyfe, David	1911	Pearson, W. H.	1911
Goodenough, George D.	1908	Peete, Joseph W.	1902
Gorman, Jacob A.	1903	Pflueger, Moritz	1904
Gough, Frank A.	1900	Pollock, H. C.	1911
Gray, B. Frank	1905	Prewitt, Paul W.	1907
Grieve, G. W.	1907	Pullen, Herbert A.	1900
Grünberg, Josef	1905	Rafter, F. W.	1900
Gunn, William A.	1904	Reoch, Norman G.	1902
Hampton, T. M.	1905	Riggs, William D.	1908
Harbour, Jenette W.	1911	Roberts, G. Arthur	1903
Hatfield, Hugh K.	1911	Rogers, Alfred P.	1903
Hawley, Charles A.	1904	Rojo, Jose J.	1904
Hellman, Milo	1908	Sayers, C. A.	1911
Hoggan, J. A. Cameron	1907	Scott, W. M.	1905
Howard, Clinton C.	1911	Shelden, Frank E.	1907
Huff, Ralph T.	1909	Singleton, L. G.	1909
Johnason, Carin	1905	Smith, W. C.	1907
Johnson, A. LeRoy	1909	Smith, William A.	1911
Johnston, W. J.	1909	Solly, A. A.	1907
Keeler, Howard D.	1903	Speers, William J.	1905
Kelsey, Harry E.	1908	Stanley, Rolof B.	1902

Stanton, Frederick L.	1905	Truesdell, Blaine	1908
Stathers, F. R.	1909	Vaughn, R. J.	1911
Steadman, C. B.	1909	Vickers, Ernest W.	1904
Stewart, J. B.	1907	Wallace, Asa A.	1905
Stilson, Ira B.	1909	Watson, Milton T.	1900
Stillwell, F. S.	1911	Watson, W. S.	1911
Strang, Robert H. W.	1906	Wayne, Albert F.	1908
Sturdevant, H. F.	1911	Weinberger, B. W.	1909
Summa, Richard	1900	White, Oliver W.	1903
Swinehart, E. W.	1909	Wilson, F. C.	1906
Talbot, William O.	1903	Wilson, W. E.	1907
Teraki, S. Y.	1907	Young, J. Lowe	1903
Tracy, Martin C.	1906		

REFERENCES

1. a. Casto, F. M.: President's Address, 1904, Trans. Am. Soc. Orthodontists, 1905, pp. 5-15.
   b. Weinberger, B. W.: Eighteen Years of the American Society of Orthodontists, New York, 1921, p. 4.
2. Weinberger, B. W.: The Introduction of the Angle System at the Ninth International Medical Congress. Memorial Meeting to the Late Edward Hartley Angle, New York, 1931, pp. 5-10.
3. Hellman, Milo: In the Contributions of the Eastern Association of Graduates of the Angle School of Orthodontia, New York, 1939, p. 3.
4. Weinberger, B. W.: Orthodontics, An Historical Review of Its Origin and Evolution, St. Louis, 1926, The C. V. Mosby Company, vol. 2, pp. 676-677.
5. Weinberger, B. W.: Eighteen Years of the American Society of Orthodontists, New York, 1921, pp. 8 and 9.
6. Weinberger, B. W.: The Eastern Association of Graduates of the Angle Schoool of Orthodontia: Its Contribution to the Advancement of Orthodontics, AM. J. ORTHODONTICS AND ORAL SURG. **25**: 990, 1939.

All other quotations are from the various announcements of the school.

119 W. 57TH STREET.

TAILORED OCCLUSION WITH THE ANTERIOR COEFFICIENT

CECIL W. NEFF, D.D.S., SAN DIEGO, CALIF.

PRODUCING normal occlusion by orthodontic means is now an exact science. Finished orthodontic cases are produced that are balanced in all respects, that is: the position of the teeth correctly related to their base, and the teeth of the maxilla to those of the mandible. All rotations and spaces are removed. Vertical height is correctly established if necessary.

This cannot always be done with metallic appliances alone. To Dr. H. D. Kesling[1] must go the credit for providing the orthodontist with the means whereby, if basic treatment is correct, perfect alignment and occlusion free of band spaces may be obtained through the use of his rubber "tooth positioner."

It is the purpose of this article to suggest a method which will further improve each occlusion by tailoring it to fit its own mathematical measurements.

During basic treatment we spend a great deal of time and care in putting teeth into occlusion. Especially is this true of the twelve anterior teeth, which seem in many cases to be the only teeth that concern the parent or the patient. In some cases proper alignment with the ideal amount of overbite is difficult to obtain. This could very well be because of a variation in proportionate tooth size of the upper and lower anterior teeth. This disharmony is known to exist. Since this problem is of tooth size it seems logical to have some mathematical guide to find each normal occlusion's individual anterior overlap.

In making positioner setups this case individuality is easily noted. It is not possible to set up every case to a standard degree of overbite and have perfect alignment and absolute contact of all teeth. This, as suggested, is because of a difference in size relationship of the upper and lower anterior teeth. Dr. George Chuck[4] of Long Beach, California, noted this variation in his work on prefabricated arches. He found it was not possible to measure only the upper teeth and use a correspondingly smaller lower arch for all cases because of this occasional size disharmony.

The "anterior coefficient" seems to be one answer to this problem. With it, it is possible to figure the amount of final overbite of each case and what effect on the overlap will be obtained by the extraction of, for example, a lower central incisor.

The anterior coefficient is figured as follows:

With a three-inch pair of dividers with needle-sharp points, the mesiodistal diameters of the six upper anterior teeth are measured (best measured in the mouth before starting treatment). The measurements are punched out on a graph card in a straight line. The total length is measured in millimeters. The same is done for the lower six anterior teeth. The lower sum is divided

into the upper sum and a figure such as 1.22 is obtained. $\frac{44.0}{36.0} = 1.22$. This is the anterior coefficient.

In the measuring of over two hundred cases a range of 24 points has been tabulated. The lowest so far measured is 1.17 and the highest is 1.41. (Table I.) This coefficient can be used as a guide to a normal occlusion's overlap only if we also have a method of calibrating the overbite.

TABLE I. VARIATIONS IN THE COEFFICIENT

CASE NO.	UPPER SIX ANTERIOR TEETH	LOWER SIX ANTERIOR TEETH	COEFFICIENT	INDICATED OVERBITE (IN PERCENTAGE)
711	42.8	34.2	1.25	26
713	44.0	36.0	1.22	20
714	52.2	39.0	1.34	35
716	50.8	40.5	1.26	30
717	47.0	38.0	1.24	25
719	50.6	39.0	1.30	35
721	51.0	40.2	1.27	30
722	46.5	36.8	1.26	30
724	49.8	40.0	1.24	25
725	59.0	36.2	1.35	40
727	43.3	37.0	1.17	10
728	50.6	38.6	1.34	40
729	43.0	35.2	1.22	20
730	51.5	39.5	1.30	35
736	49.0	38.5	1.27	30
738	46.0	35.2	1.31	35
739	49.0	38.2	1.28	30
740	44.0	34.8	1.26	30
741	44.5	34.6	1.29	35
743	51.8	42.0	1.23	20
744	48.2	37.2	1.29	35
771	46.0	33.0	1.39	55
776	45.0	37.8	1.18	15
807	53.0	39.0	1.36	40
830	50.5	36.0	1.40	55
847	45.0	38.0	1.18	15
848	47.0	34.0	1.38	50
851	48.0	34.0	1.41	55
856	47.0	35.0	1.34	40
857	46.0	38.0	1.21	20

Dr. Strang stated in his article, "An Analysis of the Overbite Problem,"[3] that "probably the average amount of overbite approximates one third the length of the maxillary incisor crowns." He measures the overbite as part of the length of the upper central incisor crown. This method of overbite measurement can be reversed to good advantage, that is, to think of overbite in percentage of coverage by the upper central incisor over the lower central incisor. Only in this way can we have an accurate picture of overbite regardless of tooth length. An end-to-end relationship would be a 0 per cent overbite, and complete coverage of the lower central incisor would be a 100 per cent overbite. Much-needed vertical height dictates a small amount of overlap as perfect. A 20 per cent overlap by this method of calibration seems ideal.

By mathematical computations (Fig. 1) with the Hawley-Bonwell triangle, it was determined that the coefficient for an end-to-end relationship is 1.10 and for a 100 per cent overlap is 1.52+. The thicker the upper central incisor, the larger this last figure will be.

The "ideal anterior coefficient" has, by the measurement of normal occlusions which show a nicely balanced 20 per cent overbite, been determined to be 1.20-1.22. Regardless of tooth size or shape, the anterior teeth can always be made to articulate ideally when the coefficient is close to these figures and the lower incisors are in an upright relationship to the mandibular plane. When the coefficient is above or below 1.20-1.22, a variation above or below a 20 per cent overbite can be obtained with otherwise perfect occlusion.

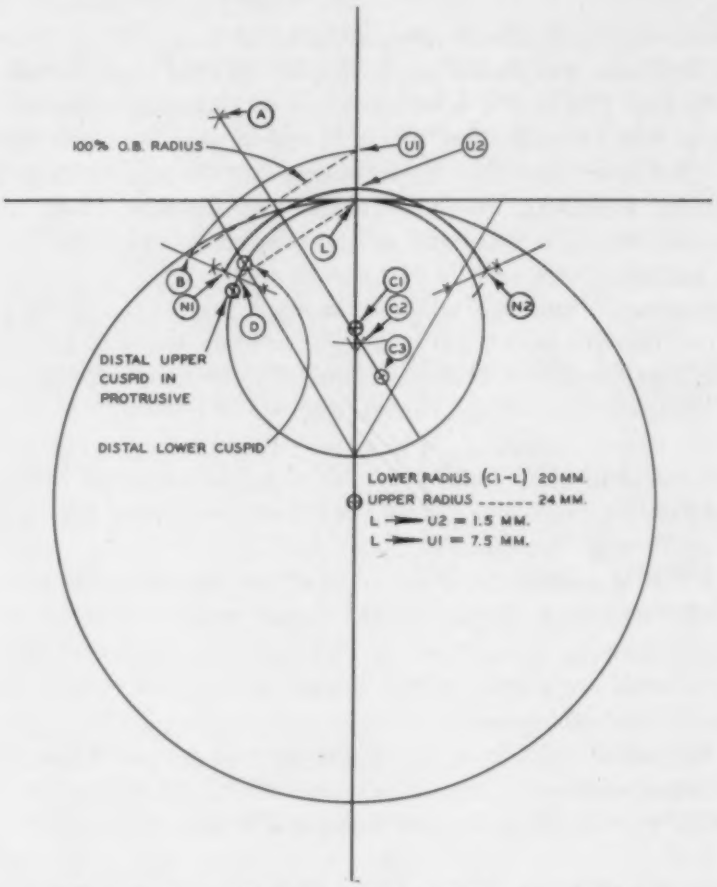


Fig. 1.—Computing the mean and extreme overbite.

As a guide to relate the anterior coefficient to the overbite, Table II has been prepared. These are only approximations, as they must be because of variations in tooth thickness.

TABLE II

COEFFICIENT	PER CENT OVERBITE
1.10	0
1.20	20 (ideal)
1.30	35
1.40	55
1.55+	100

It is interesting to note that Trubyte artificial teeth are manufactured to a relationship of 100 for the upper six anterior teeth to 83 for the lower six anterior teeth. This gives a coefficient of 1.2047 or 1.20, ideal.

To those who are interested in the method of computing the mean and the extreme coefficient, the explanation follows:

Refer to Fig. 1. The main inner circle is drawn from a radius of the measurement of the lower anterior teeth, not the upper, as in the making of an arch graph.

By measuring the thickness of the necks of many upper central incisors, the average thickness was found to be 7.5 mm. A case was selected that had an ideal coefficient of 1.20 and a central incisor of this measurement. The upper central incisor was 1.5 mm. thick where it overlapped the lower central incisor. The sum of the lower anterior teeth measured 40.0 mm. Using one-half this measurement as a radius, the inner circle was drawn. Mark off as in the Hawley-Bonwell triangle the distal of the cuspids (*L* to distal lower cuspid). The radius for the upper arch is 24 mm. Measure this distance off from point *L* on the inner circle and this will give a point that is the distal of the upper cuspids in protrusive position (*D*). Approximately halfway between these two points a line may be drawn that will represent the distal of the upper cuspids in normal occlusion with all the various degrees of overbite.

With the upper radius of 24 mm. and the compass point at *U2*, mark a cross on the distal of the cuspid line (*N*). Again with the radius of 24 mm. and the compass point at both *U2* and *N1*, make crosses so that a diagonal line may be drawn through the crosses *C2* and *A*.

Using *C2* as a center, draw the segment of a circle from *N1* to *U2*. This represents the true arch shape for the upper when the other half is drawn to *N2*. Notice how in comparison to the circle for the lower arch the spaces between the circles are thicker at the central incisor and cuspid areas and thin down for the lateral incisor area.

U2 is the labial surface of the upper central incisor in normal occlusion. *U1* is the labial surface of the upper central incisor when the whole upper central incisor is anterior to the lower central incisor as in a 100 per cent overbite.

Transfer the distance (*U1* to *U2*) below *C2* on the diagonal line and get *C3*. With the point of the compass at *C3* and the lead at *U1*, draw a segment of a circle to *B*. The straight line *B*—*U1* represents the radius for a 100 per cent overbite.

$\frac{U1—B}{C1—L}$	$\frac{30.5}{20.0}$	1.52	100 per cent overbite.
$\frac{L—D}{C1—L}$	$\frac{22.0}{20.0}$	1.10	End-to-end coefficient.

Application to treatment planning: Unfortunately, orthodontic cases of missing upper lateral incisors are all too common. If such is the case, the upper first premolar widths must be included as upper anterior teeth. One such case

on hand measures so that the coefficient including the premolars is 1.27. This is close to ideal, and finished results without difficulty are expected and experienced.

A case where a lower central incisor is missing measures to a coefficient of 1.40 using only the five lower anterior teeth. This will represent an overbite of 50 per cent or more. If one lower premolar is included in the lower anterior measurement, and the upper cuspid articulated back of it, the new coefficient becomes 1.15. This is better as it will be slightly more than an end-to-end relationship, approximately 5 per cent.

Another case with a lower central incisor completely crowded out is a temptation to extract this central incisor. The normal coefficient is 1.20 or ideal. Without this lower central incisor and the upper cuspids articulated in the normal manner back of the lower cuspids, the coefficient is 1.45. This indicates close to an 80 per cent overbite. One of three things will follow such treatment:

1. A large overbite.
2. A pronounced overjet.
3. Buckled upper anterior teeth.

But if one side is treated to a Class III one lower first premolar is then figured in the lower sum, and a new coefficient of 1.12 is obtained. This is preferable.

A Class III case in which the extraction of a lower central incisor seems logical because the mandible is so much larger than the maxilla has a coefficient of 1.32. Minus a lower central incisor and the Class III relationship allowed to remain on one side, the new coefficient is 1.20 or ideal. Whether or not this would be the proper procedure in all cases that figure as this one does depends also on facial analysis.

CONCLUSIONS

It is suspected that everything else being normal an orthodontic or non-orthodontic normal will settle to the degree of overbite indicated by the anterior coefficient. To prove this it will be necessary to measure hundreds of normal occlusions. As normals are not numerous and are hard to contact, this will take time. So far indications are favorable.

This comparing of upper and lower tooth size has been done before. It has been suggested that disharmony in tooth size might cause malocclusions. It seems rather to be the cause of normal occlusions being what they are.

REFERENCES

1. Kesling, H. D.: The Philosophy of the Tooth Positioning Appliance, Am. J. Orthodontics and Oral Surg. 31: 297-304, 1945.
2. Kesling, H. D.: Coordinating the Predetermined Pattern and Tooth Positioner With Conventional Treatment, Am. J. Orthodontics and Oral Surg. 32: 284-293, 1946.
3. Strang, Robert H. W.: An Analysis of the Overbite Problem, Angle Orthodontist 4: 65-84, 1934.
4. Chuck, George C.: Panel Discussion, Sept. 13, 1948, Edward H. Angle Society, Southern California Component, Hollywood, Calif.

1011 Bank of America Building.

PRESIDENT'S ADDRESS, GREAT LAKES SOCIETY OF ORTHODONTISTS

ELMER F. BOESTER, D.D.S., M.S.D., CLEVELAND, OHIO

AS PRESIDENT, I welcome you to this Nineteenth Annual Meeting of your organization. The men who founded this group twenty-two years ago placed firm beliefs and desires for progress in orthodontics as their pillars on which to stand. Today we are still moving forward; our society is growing and is playing an important part in the progressive march of our profession.

The basis of any group effort is generally determined by the will of the majority. With this thought in mind I took the liberty of sending you a questionnaire asking you to express your opinions. You as individual members had an opportunity to state whether or not you were having any problems which might be more satisfactorily handled by this group. We asked for criticisms and suggestions which might be of help to us, hoping that we might have your help and advice on planning a program.

The number and quality of the replies were more than encouraging. Of the one hundred twenty questionnaires sent out, 63 were returned within a period of four weeks, these representing 52 per cent of our membership. Geographically, they came from Ohio, Michigan, Pennsylvania, Indiana, New York, Kentucky, and the Dominion of Canada, Michigan and Ohio leading in numbers with 23 and 22, respectively.

You might be interested in a brief summary of these replies.

Question: Are you satisfied with the type of program presented?
The replies were: yes, 60; no, 3.

Question: Do you believe table clinics should be an integral part of each program?
The replies were: yes, 59; no, 4.

Question: Should each new member give a table clinic or case report?
The replies were: yes, 29; no, 29; undecided, 5.

Question: How many Great Lakes meetings have you attended in the last five years?
The replies showed that more than 80 per cent have attended all.

Question: How many A. A. O. meetings have you attended in the last five years?
The replies showed that 70 per cent attended all. All had attended at least one meeting during this period, indicating that the replies were received from active men in orthodontics.

Presented at the Nineteenth Annual Meeting of the Great Lakes Society of Orthodontists, Cleveland, Ohio, Oct. 18 and 19, 1948.

Question: Do you treat malocclusion in the deciduous dentition?
The replies were: yes, 43; no, 20.

Question: What is the average age of the children in your practice?
The reply was 12 years.

Question: In what per cent of your cases do you resort to extraction?
The replies were: 5 per cent, 5; 7 per cent, 3; 10 per cent, 9; 13 per cent, 3; 25 per cent, 24; 50 per cent, 9; 60 per cent, 6.

The results show extractions do play a part in orthodontic treatment, the majority extracting in 25 per cent or more of their cases. Geographically, Michigan leads in 20 of the 23 replies, favoring 25 per cent or more extraction. Ohio seems to be rather conservative, having the largest group in the 10 per cent class and only 9 reporting extractions of 25 per cent or more.

Question: How many mandibular resections have you taken care of?
The replies were: 54 in Michigan; 24 in Ohio; 18 in other states; total, 96. In Michigan 15 men reported doing resections, in Ohio, 8 men, and in other states, 6 men. The majority of the men do not advise doing resections.

Question: Do you have trouble having children excused from school?
The replies were: yes, 26; no, 37. The majority have no trouble if parents cooperate. To those of you who are having trouble, the parents must be educated to the fact that it is important to their child's future health to have normal occlusion. The orthodontist should cooperate by arranging his appointments so the patient does not miss any important classes. An appointment slip properly signed and presented to the teacher will generally allow the child to be excused providing the parents cooperate with you. If there is some resistance on the part of a teacher, a telephone call by you or the parent explaining the difficulties involved will generally result in a more cooperative effort.

Question: Does your state or country have a law in regard to being excused for dental and medical appointments?
The replies were: yes, 30; no, 23; don't know, 10. There is evidently a great deal of confusion in the minds of some members as to whether or not their states have laws or agreements with school authorities regarding children's absence from school for dental appointments. Several states have such laws, but it took considerable effort and a long period of time before legislation was enacted. There is an urgent need for such laws in all states, but they can be obtained only by the cooperation of all members with state and local dental societies.

The suggestions and criticisms received were in the minority. Here are some of the replies: "There should be prepared discussions by one or two members"; "Great Lakes has fine meetings"; "form study groups for various techniques"; "make it easier to get patients excused from school"; "better investigation of candidates"; "set time aside for other clinicians to see other clinics"; "higher ethics among membership"; and "questionnaire a good idea." Suggestion was made that another question be placed on the questionnaire: "Did you treat all your cases satisfactorily and correctly to yourself and your patient, and why?"

One can see that all the men are interested in improving the quality of our meetings. The suggestion that one or two members prepare discussions is a good one and should be given some consideration at future meetings. As a result of your answers, along with your sincere efforts and continued cooperation, I sincerely believe the Great Lakes Society will continue to go forward.

The problem of our budget should be considered. We are all aware of the rising trend in prices, so naturally the cost of meetings has increased. An increase in dues is necessary and should be discussed and voted on by this body at this meeting.

In the president's address given at Columbus, Dr. Jones, in discussing the membership requirements, made the following comment and recommendations: "It has been my privilege during my term of office to attend several district meetings. In the discussion at the business sessions, my attention has been drawn to the discrepancy in the prerequisites for membership. Inasmuch as membership in the district is the basis for ultimate membership in our Association and should be in harmony with our prerequisites, I would recommend that a committee be named to investigate and determine the qualifications for associate and active membership in the Association." The reply of the committee on the president's address was that "the matter of investigating the requirements for admission to membership in sectional societies is important, and similar rules should apply in all cases." I sincerely believe the amendment to our constitution in regard to membership is a good one. A special committee should be appointed to present our qualifications for membership for the consideration of the committee of the American Association of Orthodontists who are studying this problem.

The last few years have seen this organization increase in size to such an extent that a nominating committee would be desirable. This would allow for more careful consideration of candidates. This would follow the policy adopted by the American Association of Orthodontists. On the report on the president's address, the committee approved President Jones's endorsement of the plan to have a nominating committee with a representative from each sectional society. This representative should be our delegate to the American Association of Orthodontists with the qualification that if it is possible he concur with the majority of the members of the executive committee in regard to suggesting nominees for office and voting for them.

I believe congratulations are due two of our members who received special recognition this past year: Dr. B. Holly Broadbent, who was an essayist at the Twenty-fifth Annual Congress of the European Orthodontic Society this past summer, and Dr. George R. Moore, who was elected Secretary-Treasurer of the American Association of Orthodontists. Dr. Moore was invited to be a guest in the Netherlands this past summer, to give a series of lectures dealing with techniques of orthodontists which can be used by the general practitioner. He also appeared on the program of the European Orthodontic Society.

I would like at this time to thank specifically the various committees which have played a part in making this meeting a success: your Program Committee, consisting of Dr. Beatty, Dr. Halderson, and Dr. MacConkey, our

Vice-President, and Dr. Barnes, who compiled our preliminary and official program. With the help of the Local Arrangements Committee your President's task of arranging this meeting has been a pleasant one.

Last, but not least, I want to congratulate our new secretary, Scott Holmes. I assure you that we have an excellent secretary, and I sincerely hope he continues in this position for years to come.

In conclusion, may I take this opportunity to thank you for the honor you have conferred upon me. I have considered the work involved a privilege and a pleasure.

The future of dentistry and of orthodontics is a healthy one. We need not worry about that future if we continue to do our work with the sincerity and interest we have displayed in the past.

REPUBLIC BUILDING.

Department of Orthodontic Abstracts and Reviews

Edited by

DR. J. A. SALZMANN, NEW YORK CITY

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City

Die Zahnheilkunde im Neunzehnten Jahrhundert (Dentistry in the Nineteenth Century): By Hedvig Lidforss Strömgren. 161 illustrations, 274 pages. Copenhagen, Ejnar Munksgaard, 1945.

From the pen of one of dentistry's outstanding historians another of her well-written and authoritative histories of our profession appeared in 1945, a companion work to Dr. Strömgren's history of the eighteenth century published in 1935.

It is to be regretted that the authoress unfortunately chose to write it in German and that its publication occurred during the war. As a result it has not received the attention it deserves. While it is a well-known fact that most of the German literature to appear during the war had to be colored to meet the Nazi requirements, one can be assured that Dr. Strömgren has not allowed her mind to be so influenced, and that what she has written is based upon many years of intense study and her continued interest in dentistry's evolutionary changes.

For the first time we now have a dental history that pertains especially to the period of the nineteenth century and is an excellent picture of the development of dentistry during the last century.

Of the historian, it has been said that she writes in the present of events selected in the past, and it can truthfully be said that our authoress has captured the spirit of the times and in a concise and learned manner has so presented her subject that it retains the reader's interest throughout.

In thirteen chapters we find discussed the problems of dental prosthesis, the conservation of the teeth, the history of the drill, efforts to control pain, development of the structures of the teeth, theories of the origin of caries, antisepsis, surgery, irregularities of the teeth (orthodontics), care of the teeth in school children, dental education, professional societies, and journals. An extensive bibliography has been prepared, also an index of proper names and subjects, all of which contribute to the completeness of the work and show that the authoress is well acquainted with the most important contributions of the German, French, English, and American authorities and their writings.

The volume is excellently produced by the publishers and is a fine specimen of bookmaking art. The 161 illustrations are well selected, clear, and beautifully reproduced. The work should find a place in the library of every dentist whose professional interests reach beyond the routine demands of dental practice.

B. W. Weinberger.

Apes, Giants, and Man: By Franz Weidenreich. Pp. vii+122. Price, $3.00. Chicago, The University of Chicago Press, 1946.

This book discusses the general problem of the physical evolution of man and presents a concise, complete idea of the essential transformations of the human body and human species. According to Weidenreich, "the adoption of correct posture has brought about certain structural peculiarities in almost each individual bone of the human skeleton." This statement should receive special consideration from orthodontists since posture has been in the past such a great factor in the changes effected in the human skeleton from a phylogenetic standpoint. Is it not possible also that ontogenetic changes can also be brought about by the postural peculiarities of the child? When speaking of postural peculiarities, we have reference to those of the entire skeleton as well as to those which are limited to the dentofacial zone. The importance of the dentition in the identification of prehistoric man is to be seen in the fact that anthropologists are in agreement that man cannot have had an ancestor with a lower jaw of completely Simian character. Reduction of the size of the jaws is recognized to have gone hand in hand with a reduction in the chewing of cervical muscles.

In the anthropoids, Weidenreich points out the basal presentation of the mandibular jaw recedes at *Menton* while it projects in modern man. The chin is a comparatively later edition to the human mandible, and is not to be seen in *Hominidae* prior to those of the upper paleolithic period.

Weidenreich again explodes the misconception that special mental qualities have a correlation with the shape of the brain case. He accepts the brachycephalization as an indication that evolution of the human skeleton is still in process, and furthermore some racial groups are more advanced than others according to this point of view. However, he warns against the using of brachycephalization as a scale to gauge retardation or advancement of achievement.

The Money Value of a Man: By Louis I. Dublin, Ph.D., Second Vice-President and Statistician, Metropolitan Life Insurance Company, and Alfred J. Lotka, D.Sc., Assistant Statistician, Metropolitan Life Insurance Company, in collaboration with Mortimer Spiegelman, F.A.S., Supervisor of Mathematical Research, Statistical Bureau, Metropolitan Life Insurance Company. Revised edition. Pp. xvii+214. Price, $6.00. New York, The Ronald Press Company, 1946.

The money value of a man is measured by the present value of his net future earnings, the hypothetical question being, "What would a man's family lose if his earning capacity was stopped at any given age and, incidentally, how much insurance should a man carry to overcome such a handicap?" The authors estimate that the cost of bringing up a child from birth to the age of 18 years in an American family whose annual income is under $5,000 averages $10,000, while the cost of bringing up a child in a family whose income is from $5,000 to 10,000 amounts to over $20,000. It was computed on price levels of 1935-1936 and is considerably higher today. At the present time, these expenditures would be about $13,000 for the former group and $25,000 for the latter.

Among the topics discussed in this book are the composition of the American family, the cost of bringing up a child, disease and the depreciation of the money value of a man, and how the computed value of the earnings of the individual applied to the amount of life insurance he should carry.

Growth and Development of the Young Child: By Winifred Rand, A.B., R.N., Formerly Coordinator of Parent Services, Merrill-Palmer School; and Mary E. Sweeny, A.M., M.S., Formerly the Assistant Director of the Merrill-Palmer School; and E. Lee Vincent, Ph.D., Chairman of the Psychology Department, Merrill-Palmer School. Fourth edition. 481 pages, with 63 illustrations. Philadelphia, W. B. Saunders Company, 1946. Price, $3.00.

In this edition an attempt is made to present the coordinated findings of medicine, psychology, sociology, and education and the appraisal of the growth and development of children. The psychological and physiological needs of children are presented according to these newer precepts. Among the topics covered in this book are a review of the current concepts of growth and development, the child's physical equipment for growth and development, the social and emotional growth of children, and the care and feeding of children. A significant bibliography is appended. This book may be used as a reference source by the orthodontist who is interested in his child patients beyond the teeth and jaws.

School Health Problems: By Laurence B. Chenoweth, A.B., M.D., Professor of Hygiene, University of Cincinnati; and Theodore K. Selkirk, A.B., M.D., Assistant Professor of Clinical Pediatrics, College of Medicine, University of Cincinnati and Pediatrician, Hamilton County, Ohio, Board of Health. With an outline on **School Health Administration**: By Richard Arthur Bolt, M.D., Dr. P.H., Lecturer, School of Public Health, University of California at Berkeley, California; Former Director, Cleveland Child Health Association and Associate in Hygiene and Preventive Medicine and in Pediatrics, Western Reserve University, Cleveland, Ohio. Third edition. Price $3.00. Pp. xii+419. New York, F. S. Crofts & Co., 1947.

In the present edition of this standard work on school health problems there have been included the new methods and instruments developed since the publication of the earlier edition in 1940. This applies especially to the use of ultraviolet lamps for sterilizing and nutritional factors influencing growth. Among the factors influencing growth discussed in this book are the endocrines, heredity, climate, health habits, disease, and socioeconomic status.

Dental defects are declared to be almost universal; nevertheless, the amount of space given to dental needs and correction is not more than that given to any of the usual diagnostic procedures. On the whole, the value of this book to the orthodontist is bound to lie in its discussion of growth and development of the child, on which subject a brief review is presented.

Standards of Dental Care in Public Health Programs for Children: By Norman F. Gerrie, *Am. J. Pub. Health* **37**: 1317-1320, October, 1947.

Although it is generally agreed by dental administrators that the objectives of the public health dental program may be accomplished by education, prevention, and treatment, there has been much discussion relative to the potential scope or definition of each of these three basic features of the dental program. Dental health education is a prominent feature of dental programs. In some cases it is the exclusive feature. In practice, dental health education of the public by state agencies may extend from the presentation of simple

facts on dental health for the guidance of the individual to an attempt at exposition of the whole field of dentistry as it is known and understood by the dentist.

Considering the present available information on the scope of services required to assure the health of young patients, an oral health program should provide treatment, preventive measures, and health education. If dental health programs are developed for the youngest age groups and continuity of care provided thereafter, an accumulation of defects is impossible; an optimum condition of health, comfort, appearance, and function would be maintained throughout the period of childhood.

H. C. Sandler.

Case Histories of Five Thumb-Sucking Children Breast Fed on Unscheduled Regimes, Without Limitation of Nursing Time. By Frances P. Simsarian, *Child Development* **18**: 180-184, December, 1947.

On the basis of a study of numerous feeding histories Levy has concluded that the primary cause of finger-sucking is insufficient sucking at breast or bottle. Statistics from his study demonstrate that the percentage of finger-sucking problems is also consistent with the sucking time, rising as high as 40 per cent in infants fed at four-hour intervals to as low as 6 per cent in unscheduled feeders. There was not one instance of finger-sucking in the case of children who used pacifiers. Several children with rickets whose feeding histories showed sufficient sucking time did not develop the thumb-sucking habit, thus ruling out the nutritional factor as a primary cause, according to the findings of Levy.

Roberts' study of 15 thumb-suckers and 15 non-thumb-suckers confirmed the findings of Levy that the amount of time spent in sucking is the primary determinant of the habit of sucking the thumb or fingers. Roberts found that in general non-thumb-suckers took a longer time for feeding than was taken by thumb-suckers. Eight of the thumb-suckers studied by Roberts averaged less than sixty-nine minutes of feeding in twenty-four hours during the first seven to eight months of life. No thumb-suckers were found in the group which averaged more than one hundred thirty minutes of feeding in twenty-four hours during the first seven to eight months of life.

Davis, in using a questionnaire with 250 parents to explore the problem of thumb-sucking, found no thumb-suckers among those children who were not kept to any schedule.

The 5 thumb-sucking children whose feeding histories are described here were contacted during the course of a study of children fed on unscheduled or so-called self-demand feeding programs. The study included 26 children who had been fed on self-demand feeding programs in 20 different families.

At least 5 of these self-demand feeders were thumb-suckers. In view of the fact that no specific questions regarding thumb-sucking were asked during the course of the contacts with the parents, it is possible that more of the group sucked their thumbs or fingers. However, in view of the findings of the studies mentioned, it was surprising to discover as many as 5, or 19 per cent of this group of 26 children, sucking their thumbs at some time during the first years of life.

The feeding case histories of 5 thumb-sucking children breast-fed on self-demand feeding regimes without limitation in nursing time are discussed. Each of these children presented a different feeding history and the thumb-sucking picture was similarly different in its onset, intensity, and persistence. Two of the thumb-suckers studied were siblings and another had an older

sibling who also sucked her thumb. This latter child, however, was not fed on a self-regulating feeding regime. The other two thumb-suckers considered subsequently had younger siblings, neither of whom was a thumb-sucker, thus ruling out any ready conclusion that thumb-sucking inevitably runs in families.

The fact that these five thumb-suckers appeared in a study of only 26 self-demand feeders and that they therefore represent 19 per cent of the total sampling is subject to the criticism that the total sampling of cases is small. Such a high percentage of thumb-suckers in a group of self-demand feeders might never again appear. It should of course be recalled at this point that Levy did find a 6 per cent incidence of thumb-sucking in his larger group of unscheduled feeders. The facts presented leave one no alternative but to conclude that whatever the cause or cure of thumb-sucking, self-regulated feedings without limitation in nursing time are no complete panacea.

This conclusion finds substantiation in an article by Bragman in which he discusses instances of thumb-sucking as portrayed in art, thus pointing up the fact that thumb-sucking apparently occurred in cultures where, as far as we know, all children were fed on self-regulating schedules and permitted unlimited nursing time.

An Introduction to the History of Dentistry With Medical and Dental Chronology and Bibliographic Data: By Bernard Wolf Weinberger, D.D.S., New York City. Two volumes. Illustrated. 992 pages. Price $20. St. Louis, The C. V. Mosby Company, 1948.

These two volumes, intended to serve as an introduction to the history of dentistry, are publications of which the profession can be proud. They give substance and meaning to the origins of dentistry which go back to prehistoric times. It is surprising how little dentists actually know of the significance and importance of the teeth in anthropologic research. These two scholarly volumes make interesting and entertaining reading and should be in the library of every dentist and historian.

Weinberger has gone far afield in his researches and presents interesting facts not only for dental and medical readers, but also for all who are interested in history.

Volume I, which starts with dental experiences in the Stone Age, continues through ancient dentistry in the Orient, Greece, the Roman Empire, and pre-Columbian America. This will be found of intense interest not only to dentists, but to general readers as well. The chronicles of dentistry are then brought along through the Middle Ages, the barber surgeons, to the renaissance in dentistry when there was a revival of the study of anatomy and physiology.

Volume II bears the title, "An Introduction to the History of Dentistry in America." It picks up the development of dentistry which appears to have started in America in the year 1630. It would be interesting to know what the status of dentistry was in Spanish America prior to that date. Dentistry in the American colonial period was practiced by two classes of men whom Dr. Weinberger describes in an extremely interesting manner. There were, of course, the "tooth drawers" and mechanics who approached their work from a purely mechanical angle. On the other hand, there was also a large number of physicians who not only extracted teeth but also engaged in other forms of dental practice. It was to the latter group that present-day dentistry owes its origin.

On the whole, it may be said that dentistry has always been a product of its times. With the growth of scientific knowledge, dentistry took advantage of general advancement and adopted scientific methods.

Of especial interest will be found the chapter on George Washington and his dental experiences. Dr. Weinberger here presents many anecdotes and sidelights of an intimate and extremely interesting nature, never previously related in print.

The *History of Dentistry* produces a profound appreciation of the Herculean labor and research accomplished by Dr. Weinberger. To many, the review of a history which all too often is lengthy, dry, and verbose reading becomes a hurried examination of chapter titles, of illustrations, and a brief reading of the context here and there. Not so in this case. Your reviewer believes that no one can fail to be interested in this two-volume epic which, while written by an orthodontist, is the product of a man with a wide vision of the whole field of dentistry. Dr. Weinberger has done a monumental research job. Only one who loves his field supremely and who takes delight in ferreting out the many historical data could have spent the time required. The dental profession owes Dr. Weinberger much for the scholarly presentation of the background of the whole field of dentistry.

His previous work, *History of Orthodontics,* showed the fallacy of believing that there is anything new in orthodontic ideas. And so in this new book, crown and bridge men today will find the first practitioners of that art in 3000 B.C. Endodontists will find that their ancestors drilled through to the apex to relieve apical abscesses. Present advocates of synthetic urea for the prevention of caries would find that it was advocated centuries ago.

The list of references is a valuable addition to this work, and even if this were all you received for the price of the books you would have much worthwhile material. However, added to this is a delightful and cultural history. It is a storehouse of dental facts, a definite contribution to our profession. The volumes also have a detailed index.

The author deserves great credit for the excellence of his illustrations. Reproductions of early manuscripts, of paintings, instruments, bridgework, of newspaper clippings of early advertisements by dental practitioners—no ethics committee to stop their weird statements—make the book a valuable and fascinating compilation.

It is to be hoped that Dr. Weinberger will continue his series of volumes on the history of dentistry and bring the work up-to-date. We know of no greater service that could be rendered to the profession than to preserve its annals which are so important to continued progress. This work is long overdue and should be supported and encouraged by individual dentists and by organized dentistry.

G. S. Callaway.

News and Notes

Last Call to the American Association of Orthodontists' Forty-fifth Annual Meeting, May 2 to 6, 1949, Hotel Commodore, New York City

My Dear Friends:

New York and the Northeastern Society of Orthodontists are all ready to greet you at the A. A. O. meeting.

I feel like a friend of mine who wrote me and said, "I am too busy to come up there with a sheriff and handcuffs to get you to come down here to go fishing with me—but if you don't come voluntarily, I may have to do just that, for I do not want you to miss the wonderful fishing that we are having down here."

This is just the set-up for the A. A. O. meeting!

Your program committee has arranged a series of fine scientific sessions for you, including outstanding essayists on the most important orthodontic topics of the day, registered educational clinics, and a selected group of table clinics.

Your general and local arrangements committees have all details worked out for a fine, smooth-running meeting.

Your reception committee is awaiting the opportunity to greet you.

Your entertainment committees have scheduled a boat ride, Campfire Club outing, luncheons, and a very exceptional banquet, for you.

Your commercial exhibits committee has a lot of manufacturers' exhibits listed which will be of great practical value to you.

And what a wonderful job your ladies' committees are doing—a "get-acquainted" tea, ladies' luncheon, trip to the United Nations, banquet, theaters, etc.

This is the last call! Come and see your friends and have a wonderful and most profitable time.

LOWRIE J. PORTER, President.

American Board of Orthodontics

The 1949 meeting of the American Board of Orthodontics will be held at the Commodore Hotel, New York, N. Y., April 28, 29, 30, and May 1. Orthodontists who may desire to be certified by the Board may obtain application blanks from the Secretary, Dr. Stephen C. Hopkins, 1726 Eye Street, N.W., Washington 6, D. C.

Twenty-first General Meeting of the Pacific Coast Society of Orthodontists

The Central Section again upheld its time-honored reputation for hospitality and arrangements for the Pacific Coast Society of Orthodontists. The 1949 biennial meeting at the Palace Hotel in San Francisco on Feb. 21, 22, and 23, 1949, was an outstanding success and we will all look forward to our next meeting in 1951.

President Sid Hoskin presided at a meeting of the Board of Directors on Sunday afternoon, all members being in attendance. Our indefatigable Secretary, Frederick T. West, and staff were on the job at the registration desk, and the regular session opened

on time at 9:30 Monday morning to hear Dean Willard C. Fleming of the University of California give his opening address of welcome.

The morning session was taken up with the President's address, the charge to the new members by J. Camp Dean, a paper by Dr. Joseph P. Weinmann, Associate Professor of Histology of the University of Illinois College of Dentistry, and a paper by Dr. James David McCoy of Beverly Hills, California.

In the afternoon, Dr. F. M. Calmes of the Graduate Department of Orthodontics, University of Kansas City, read a paper on the universal appliance. The paper had been prepared by Dr. George Nagamoto, of the same university, whose illness prevented him from attending the meeting. This paper was followed by those of Paul Lewis and C. H. Walrath. All papers were well prepared and read in a masterful manner, leaving no room for doubt that a great deal of time and effort had been applied to the various subjects presented.

As is our custom, we play as hard in the evenings as we work in the daytime. The banquet given by the Central Section was no exception. E. M. Johnston served as toastmaster, and Aldys J. Gray, with his faithful guitar, went through his repertoire of songs in his own inimitable style. Then, Dr. R. Gordon Agnew, Head of the Section of Oral Diagnosis, University of California, gave us a very interesting talk on his long service in the Far East; he gave us a different viewpoint on conditions in China than we get over the radio or from the press. A good time was had by all.

Tuesday was taken up by individual and group clinics. These were followed at the luncheon hour by round-table discussions, presided over by men well versed in their topics for consideration. In the afternoon, Dr. Weinmann gave another of his specially prepared papers which was an inspiration to all. C. W. Carey read a very interesting paper entitled "Linear Arch Dimensions and Tooth Size," which showed signs of much research and scientific development. Such papers are always well received by the Society.

There being no scheduled entertainment for the evening, small groups were formed and the San Francisco night life was enjoyed, some visiting the clubs, others eating in the fine old restaurants which are filled with so much tradition—and food. The "Top of the Mark" and Starlit Roof seemed to attract everyone at some time during the evening.

Wednesday morning was taken up by three group clinics headed by James McCoy, F. M. Calmes, Stenson Dillon, and Paul Lewis. These well-rounded demonstrations held the undivided attention of the members during the morning session and proved to be of outstanding practical value to all who watched the various types of appliances being demonstrated.

The Wednesday afternoon session closed the convention. Wendell L. Wylie and Alton B. Moore discussed the cephalometer and its relation to orthodontic practice. James T. Walls gave a most enlightening paper on the "Professional Man's Approach to Public Relations." His paper was well received and gave us all plenty of food for thought and action.

The business session wound up a very fine, well-balanced meeting. Reuben L. Blake was elected to the office of President-Elect; we thereby lost a good editor but gained a first-class man to preside over our destiny two years hence. M. R. Chipman was elected Vice-President, and our very worthy Frederick T. West was re-elected Secretary-Treasurer.

We shall all look forward to our next meeting in 1951 with the capable and whimsical C. F. Stenson Dillon on the chair.

E. M. JOHNSTON.

Denver Summer Seminar

The Twelfth Denver Summer Seminar for the advanced study of orthodontics will be held July 31 to Aug. 5, inclusive, 1949, at the Park Lane Hotel, Denver, Colorado. Dr. Howard Yost, Grand Island, Nebraska, is the new president of the Denver Summer Seminar, and Dr. E. S. Linderholm, Denver, Colorado, the new secretary. The complete program for the seminar will be announced early in 1949.

Twenty-eighth Annual Meeting of the Southwestern Society of Orthodontists

The Twenty-eighth Annual Meeting of the Southwestern Society of Orthodontists was held Sunday, Monday, Tuesday, and Wednesday, March 13, 14, 15, and 16, 1949, at the Texas Hotel, Fort Worth, Texas, under the direction of President J. C. Williams and committees.

The following program was given:

Meeting called to order by President J. C. Williams, D.D.S.

Welcoming address: Eugene Brown, D.D.S., President, Fort Worth District Dental Society.

Response: Hamilton Harper, D.D.S., Shreveport, Louisiana.

President's address: J. C. Williams, D.D.S.

Your American Association. Lowrie J. Porter, D.D.S., New York, New York, President of the American Association of Orthodontists.

Clinical Approach to Orthodontic Therapy. Joseph D. Eby, D.D.S., New York, New York.

Discussion by Lowrie J. Porter, D.D.S.

Business Luncheon. For members of the Southwestern Society and the American Association only.

The Basic Architecture of the Human Face: Its Importance to the Orthodontist. Wendell L. Wylie, D.D.S., San Francisco, California.

An Editor's Viewpoint on Present-Day Orthodontics. H. C. Pollock, D.D.S., St. Louis, Missouri.

Tuesday, March 15, 1949

Practical Assessment of Facial Morphology. Wendell L. Wylie, D.D.S., San Francisco California.

Continuation. Joseph D. Eby, D.D.S.

Discussion. Lowrie J. Porter, D.D.S.

Business luncheon for members of the Southwestern Society of Orthodontists and the American Association of Orthodontists only.

Case Report. Hugh A. Sims, M.S.D., Tulsa, Oklahoma.

Case Report. Julius Tomlin, D.D.S., Dallas, Texas.

Wednesday, March 16, 1949

Indoctrination breakfast (place will be announced). Newly elected members will meet with the Indoctrination Committee for explanation of ideals and purposes of the society.

Table clinics.

Business luncheon. Members of the Southwestern Society of Orthodontists and American Association of Orthodontists only.

TABLE CLINICS

WALTER S. LIPSCOMB, D.D.S., CHAIRMAN

Arrangement and Operation of Our Orthodontic Office. Brooks Bell, Joe Favors, and Frank Roark, Dallas, Texas.

Atkinson Universal Appliance. John A. Rowe, San Antonio, Texas.

Impacted Canines Treated Using the Johnson Twin-Wire Mechanism. John W. Richmond, Kansas City, Kansas.

Useful Attachments. Homer A. Potter, Kansas City, Missouri.

A Simple Method for the Construction of the Headcap and Assembly. Donald A. Closson, Kansas City, Missouri.

Removable Appliances. W. B. Stevenson and W. B. Stevenson, Jr., Amarillo, Texas.

Treated Cases With the Edgewise Arch. Tom M. Williams, Dallas, Texas.

A New Camera. S. D. Terrell, Fort Worth, Texas.

Atypical Problems and Atypical Answers. Harry H. Sorrels, Oklahoma City, Oklahoma.

Analysis and Treatment of Several Cases. D. P. Comegys, Shreveport, Louisiana.

Labiolingual Appliances. W. R. Alstadt and T. Smith, Little Rock, Arkansas.

Sixth Annual Seminar for the Study and Practice of Dental Medicine

The Sixth Annual Seminar for the Study and Practice of Dental Medicine at Palm Springs, California, will follow the American Dental Association Convention to be held in San Francisco October 17-21. The dates set for the Seminar, October 23-28, are conveniently arranged to enable those interested to attend both important gatherings.

Applications are currently being accepted, and, inasmuch as facilities are limited, early arrangements should be made by contacting Miss Marion G. Lewis, Executive Secretary, 1618 Ninth Avenue, San Francisco 22, California.

Seven outstanding speakers will discuss and compare the most recent discoveries in dentistry and the related fields of medicine and biology. They include: Arthur C. Curtis, M.D., Professor and Director of the Department of Dermatology and Syphilology at the University of Michigan; Wilton Marion Krogman, Ph.B., M.A., Ph.D., Professor of Physical Anthropology, University of Pennsylvania; Seymour M. Farber, M.D., Assistant Clinical Professor of Medicine, University of California Medical School; Balint Orban, M.D., D.D.S., Professor at the University of Illinois; D. Harold Copp, M.D., who is collaborating with the Division of Dental Medicine at the University of California; Francis A. Arnold, Jr., B.S., D.D.S., Senior Dental Surgeon, United States Public Health Service; and Paul Popenoe, Sc.D., Director of the American Institute of Family Relations in Los Angeles.

President of the Seminar is Dr. Hermann Becks, Chairman of the Division of Dental Medicine, College of Dentistry, University of California.

Army Displays Services to Dental Profession

Three Army services to civilian dentists were brought to the attention of the profession in a five-panel exhibit displayed at the midwinter meeting of the Chicago Dental Society, February 7-11. The exhibit was prepared by the Army Medical Illustration Service in cooperation with the Dental and Oral Pathology Section of the Army Institute of Pathology.

To aid the practicing dentist in obtaining the type and quantity of biopsy material on which Army pathologists may base accurate reports, a biopsy technique developed through study of 15,000 tumors of the mouth was demonstrated in flash-box drawings and photographs. Strict adherence to suggestions enumerated and portrayed in the exhibit, Army pathologists state, will minimize distortions caused by improper surgical procedure and inadequate fixation, insuring more realistic reports to the clinician.

Another panel of the exhibit presented a re-evaluation of the clinical feature of lip cancer, based on the Army's continuous research in carcinoma of the mouth.

Illustrations from the professionally well-known "Registry of Dental and Oral Pathology" suggested the far-reaching benefits of cooperation between Army and civilian groups in the accumulation of research material.

Army services of which the civilian dentist may avail himself without cost include, in addition to the biopsy service, the use of the "Home Study Set of Microscopic Slides," and thirty-five different "Loan Study Sets of Kodachrome Slides" showing diseases of the mouth. Requests for use of this material should be addressed to the Director, Army Institute of Pathology, Washington 25, D. C.

Secretary Forrestal Names Campaign Committee to Obtain Physician and Dentist Volunteers

A national campaign seeking physician and dentist volunteers for the Armed Forces began today.

The National Military Establishment estimates that approximately 18,000 young men received, in whole or in part, their professional educations at government expense under the ASTP and V-12 programs. Of these, some 10,000 have served in the Armed Forces. The 8,000 of this group, and around 7,000 more who were deferred to continue their professional educations at their own expense, did not see combat. They will now be asked to volunteer for a period of one or two years of service.

The drive was proposed to Secretary Forrestal by his recently appointed Armed Forces Medical Advisory Committee as a prerequisite to any resort to compulsory induction of such personnel. This committee is composed of eleven civilian leaders of the medical and allied professions and the surgeons general of the Army and Navy and the air surgeon. It is headed by Charles Proctor Cooper, President of the Board of Trustees of Presbyterian Hospital in New York City, who is Deputy to Secretary Forrestal for Medical and Allied Professional Matters.

When recommending the drive for volunteers, the Advisory Committee stated that it will make a careful and continuing review of the work load of the medical and dental services and of the utilization of professional personnel to determine where economies can be made.

The campaign committee is headed by Major General Raymond W. Bliss, Surgeon General of the Army, who will act as Chairman. The other members are Rear Admiral Clifford A. Swanson, Surgeon General of the Navy, and Major General Malcolm C. Grow, The Air Surgeon. It will report to Chairman Cooper of the Medical Advisory Committee in his capacity as Deputy to Secretary Forrestal.

The campaign committee, Secretary Forrestal said, will serve as liaison between the National Military Establishment and the American Medical Association, the American Dental Association, and other interested professional and nonprofessional groups.

In a memorandum to the secretaries of the Army, Navy, and Air Force, Secretary Forrestal asked that they take all possible steps to assure greatest possible success of the campaign.

The program proposed by the committee would be a cooperative effort to the medical and dental professions and the medical services of the Armed Forces. The committee pointed out that estimated shortages in the Armed Forces by the end of July, 1949, will be about 1,600 physicians and about 1,160 dentists. By next December this shortage will total approximately 2,200 physicians and 1,400 dentists.

Announcing his approval of the recommendation for the campaign, Secretary Forrestal said it is designed primarily to obtain the required professional personnel from two groups of young physicians and dentists who the Medical Advisory Committee feel owe an obligation to volunteer. They are:

1. The young men who received the benefits of the wartime ASTP (Army Student Training Program) and the similar Navy V-12 program but subsequently performed little or no service, and

2. Those others who were deferred from service during the war in order that they might complete their educations at their own expense.

Physicians and dentists are asked to volunteer for a minimum of one year and would receive $100 a month in addition to prescribed pay and allowances for their rank.

Physicians and dentists who volunteer for service will be used, as far as possible and feasible, in assignments commensurate with their professional skills and abilities. Arrangements would be made by the services to allow individuals who volunteer at this time to finish their training periods before being called to active duty. Calls to active service would be staggered so as to cause minimum disruption to civilian hospital training programs.

In a special press conference at Washington last Friday (Feb. 25), Secretary of Defense James Forrestal warned that failure of the new campaign to secure volunteers will result in "more drastic" measures such as a request for a special draft law to get dental and medical officers. Also under consideration under the "drastic" classification are proposals to hold present dental and medical officers beyond their present obligated periods of duty and to call up health practitioners who are members of the Army and Navy Reserve Corps. These latter two proposals, government officials indicated, will be employed only as a last resort. Mr. Forrestal also revealed that about a third of the present dental and medical officers are due to get out of service next July. Several hundred thousand dollars will be expended in the new public relations campaign in an effort to "persuade" young dentists and physicians to volunteer for two-year periods of active duty.

In announcing the new campaign, which has been termed Operation Moral Suasion at the Pentagon, Mr. Forrestal said: "It should be made clear to the various communities in America that we are not making an effort to obtain doctors from sorely needed areas, nor creating any further shortage of physicians and dentists in civilian communities. We are only replacing those physicians and dentists who will be going from active duty to civilian practice."

Notes of Interest

Wallace H. Black, D.D.S., M.S.D., announces the opening of his office at 300 Medical Arts Building, 415 East Yandell Boulevard, El Paso, Texas, telephone 3-3392, practice limited to orthodontics.

Dr. Martin Blumenfeld is now established at 100 South Village Avenue, Rockville Centre, New York, by appointment, telephone Rockville Centre 6-1985, practice limited to orthodontics.

OFFICERS OF ORTHODONTIC SOCIETIES

The AMERICAN JOURNAL OF ORTHODONTICS is the official publication of the American Association of Orthodontists and the following component societies. The editorial board of the AMERICAN JOURNAL OF ORTHODONTICS is composed of a representative of each one of the component societies of the American Association of Orthodontists.

American Association of Orthodontists

President, Lowrie J. Porter - - - - - - - - - 41 E. 57th Street, New York, N. Y.
President-Elect, Max E. Ernst - - - - - 1250 Lowry Medical Arts Bldg., St. Paul, Minn.
Vice-President, William R. Humphrey - - - - - - - 1232 Republic Bldg., Denver, Colo.
Secretary-Treasurer, George R. Moore - - - - - - 919 Oakland Ave., Ann Arbor, Mich.

Central Section of the American Association of Orthodontists

President, Joseph H. Williams - - - - - - - - 3720 Washington Blvd., St. Louis, Mo.
Secretary-Treasurer, Earl E. Shepard - - - - - - - - - 4500 Olive St., St. Louis, Mo.

Great Lakes Society of Orthodontists

President, Wilson R. Flint - - - - - - - - - - - - Jenkins Arcade, Pittsburgh, Pa.
Secretary-Treasurer, Scott T. Holmes, 509 Hackley Union National Bank Bldg., Muskegon, Mich.

Northeastern Society of Orthodontists

President, Norman L. Hillyer - - - - - - - - - Professional Bldg., Hempstead, N. Y.
Secretary-Treasurer, Oscar Jacobson - - - - - - - - 35 W. 81st St., New York, N. Y.

Pacific Coast Society of Orthodontists

President, S. B. Hoskins - - - - - - - - - - - Medical Dental Bldg., Portland, Ore.
Secretary-Treasurer, Frederick T. West - - - - - 870 Market St., San Francisco, Calif.

Rocky Mountain Society of Orthodontists

President, Harry V. Banks - - - - - - - - - - - - 1550 Lincoln St., Denver, Colo.
Vice-President, Elmer S. Linderholm - - - - - - - - 1558 Humboldt St., Denver, Colo.
Secretary-Treasurer, Ernest T. Klein - - - - - - - 632 Republic Bldg., Denver, Colo.

Southern Society of Orthodontists

President, Samuel D. Gore - - - - - - - - Maison Blanche Bldg., New Orleans, La.
Secretary-Treasurer, Frank P. Bowyer - - - - - - Medical Arts Bldg., Knoxville, Tenn.

Southwestern Society of Orthodontists

President, J. C. Williams - - - - - - - - - - Medical Arts Bldg., Fort Worth, Texas
Secretary-Treasurer, Marion A. Flesher - - - - - Medical Arts Bldg., Oklahoma City, Okla.

American Board of Orthodontics

President, Bernard G. deVries - - - - - - - - Medical Arts Bldg., Minneapolis, Minn.
Vice-President, Joseph D. Eby - - - - - - - - - - 121 E. 60th St., New York, N. Y.
Secretary, Stephen C. Hopkins - - - - - - - 1726 Eye St., N. W., Washington, D. C.
Treasurer, James A. Burrill - - - - - - - - - - - 25 E. Washington St., Chicago, Ill.
James D. McCoy - - - - - - - 405 North Bedford Drive, Beverly Hills, Calif.
Reuben E. Olson - - - - - - - - - - - - 712 Bitting Bldg., Wichita, Kan.
Raymond L. Webster - - - - - - - - 133 Waterman St., Providence, R. I.

There is an apparent discrepan

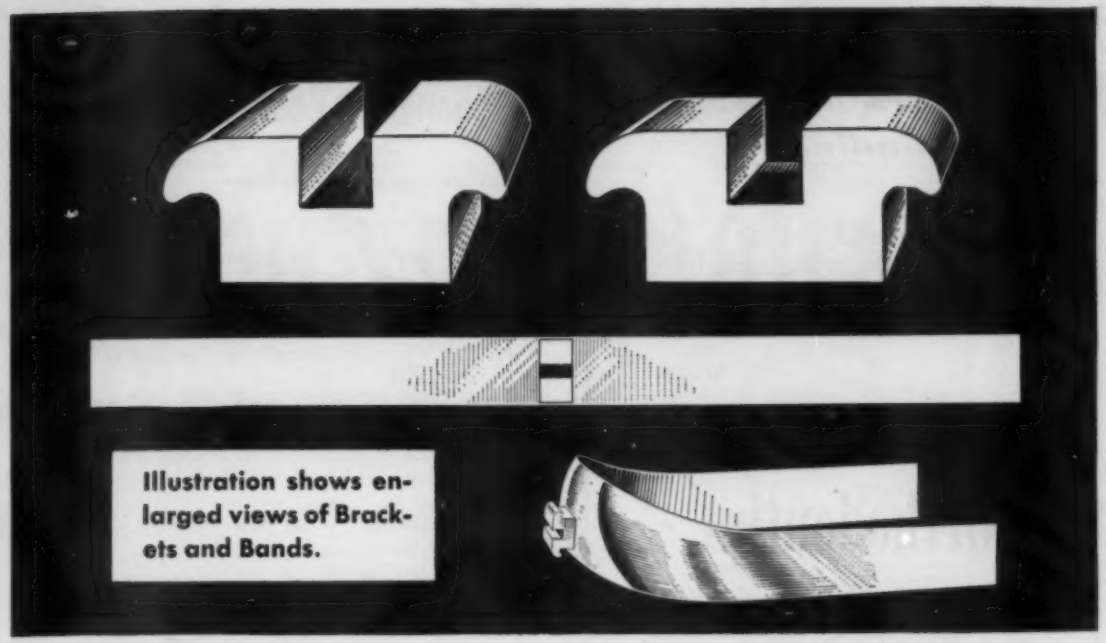
The pages are either missing o

The filming is recorded as the

ncy at this point.

or the pagination is incorrect.

book is found in the collections.



Aderer's EDGEWISE BRACKETS ... AND BRACKET BANDS

Aderer Edgewise Brackets are accurately machined to the close tolerance of fine precision instruments. The platinum-color precious metal used is hard, serviceable and high-fusing—alloyed to provide the precise physical properties required to meet the service to which the appliance is subjected. Aderer Edgewise Brackets are available in two widths .05″ and .10″.

They are also available redi-mounted to bracket bands made of the famous Aderer Temperable Band Material. The Doctor may choose the flat .004″ x .125″ x 1¾″ or .004 x .150 x 2″ bands or Dr. Downs' Contoured Bands. The latter are supplied in sizes for molar, cuspid and anterior.

115 West 45th St.
New York City

ADERER GOLDS
Julius Aderer, Inc., New York · Chicago

55 E. Washington St.
Chicago

Changing Your Address?

When you move, please—

(1) Notify us to change your address—allow us six weeks to make the change.

(2) Mention the name of this Journal. (We publish eleven periodicals.)

(3) Give us your old address. If possible, return the addressed portion of the envelope in which we sent your last copy.

(4) Give us your new address—complete—including the Postal zone number.

(5) Please print your name and address.

Thank You!

Circulation Department, The C. V. Mosby Company, Publishers, 3207 Washington Blvd., St. Louis 3, Mo.

Back Copies WANTED!

The publishers require copies of the following back issues of The American Journal of Orthodontics for libraries and subscribers to complete broken files:

1923: February
1925: December
1947: February, March, December

We will pay $ .60 for each copy

Address copies to: A. W. Volland, Circulation Manager, The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, Missouri.

AMERICAN JOURNAL OF ORTHODONTICS

Published by THE C. V. MOSBY COMPANY, 3207 Washington Blvd.
St. Louis 3, U. S. A.

Entered at the Post Office at St. Louis, Mo., as Second Class Matter.

Published Monthly, Subscriptions may begin at any time.

Official Publication of The American Association of Orthodontists, its components societies and The American Board of Orthodontics

EDITORIAL COMMUNICATIONS

Original Communications.—Manuscripts for publication and correspondence relating to them should be sent to Dr. H. C. Pollock, 8015 Maryland Ave., St. Louis 5, Mo., U. S. A.

Manuscripts should be typewritten on one side of the paper only, with double spacing and liberal margins. References should be placed at the end of the article and should include, in the order given, name of author, title, journal, volume, pages, and year; e.g., Smith, E. J.: Children's Dentistry, Am. J. Orthodontics, 34: 1-25, 1947. Illustrations accompanying manuscripts should be numbered, provided with suitable legends, and marked on margin or back with author's name. Articles accepted for publication are subject to editorial revision. Neither the editors nor the publishers accept responsibility for the views and statements of authors as published in their "Original Communications."

Illustrations.—A reasonable number of half-tone illustrations will be reproduced free of cost to the author, but special arrangements must be made with the editor for color plates, elaborate tables, or extra illustrations. Copy for zinc cuts (such as pen drawings and charts) should be drawn and lettered only in India ink, or black typewriter ribbon (when the typewriter is used), as ordinary blue ink or colors will not reproduce. Only good photographic prints or drawings should be supplied for half-tone work.

Books for Review.—Only such books as are considered of interest and value to subscribers will be reviewed, and no published acknowledgment of books received will be made. These should be sent to Dr. J. A. Salzmann, 654 Madison Ave., New York City.

Reprints.—Reprints of articles published among "Original Communications" must be ordered specifically, in separate communication to the publishers, The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, Mo., U. S. A., who will send their schedule of prices. Individual reprints of an article must be obtained through the author.

BUSINESS COMMUNICATIONS

Business Communications.—All communications in regard to advertising, subscriptions, change of address, etc., should be addressed to the publishers, The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, Mo.

Subscription Rates.—Single copies, $1.00. In the United States and other countries of the U. S. Postal Zone $10.00 per year in advance. In Canada and other foreign countries $11.00.

Remittances.—Remittances for subscriptions should be made by check, draft, post-office or express money order, payable to the publishers, The C. V. Mosby Company.

Change of Address.—The publishers should be advised of change of subscriber's address about fifteen days before the date of issue, with both new and old addresses given.

Advertisements.—Only articles of known scientific value will be given space. Forms close first of month preceding date of issue. Advertising rates and page sizes on application.

Foreign Depots.—Great Britain—Henry Kimpton, 26 Bloomsbury Way, London, W. C. 1; **Australia**—Stirling & Co., 317 Collins Street, Modern Chambers, Melbourne.

Nonreceipt of Copies.—Complaints for nonreceipt of copies or requests for extra numbers must be received on or before the fifteenth of the month following publication; otherwise the supply may be exhausted.

S·S·White PRECIOUS METAL WIRES for Arches and Springs

NO. 61 METALBA – Platinum Color

A high-grade, exceptionally strong, tough, springy wire. No. 61 Metalba is the highest grade orthodontic wire of our manufacture. It is high fusing, and maintains its high physical properties after soldering operations.

$3.90 per dwt.

GOLD PLATINUM – Gold Color

Gold Platinum Wire has been proving its merits for all types of arches and springs for more than a quarter century. It's easy working, strong, tough, springy, and doesn't "tire" or lose its elasticity while orthodontic treatments are in progress.

$3.00 per dwt.

NO. 12 CLASP

A high grade wire with physical properties that rival closely those of the highest priced orthodontic wires. It's almost as strong as the strongest, moreover, it is very tough and elastic, and an exceptional arch wire.

$2.80 per dwt.

S. S. WHITE METALBA BRAND BAND MATERIAL

A high-fusing, non-tarnishing all precious metal, medium hard band material, costing little more than base metal products. It's easy working, tough, and has good strength—sufficient for all orthodontic purposes. Metalba Band Material requires no particular heat treatment. It is high fusing and gold solder of any fineness may be used with it.

$2.15 per dwt.

ALL MADE IN POPULAR GAGES AND WIDTHS

Prices subject to change

THE S. S. WHITE DENTAL MFG. CO., 211 S. 12th STREET, PHILADELPHIA 5, PA.